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# ▲▲▲ THE IRON AGE ▲▲▲

APRIL 18, 1940

ESTABLISHED 1855

Vol. 145, No. 16

## *Birth Control of Small Enterprises*

ONE of the pronouncements of the New Deal armchair philosophers is that business concerns and industrial corporations have become too large. These gentlemen think that there should be more small concerns than there are and that the way to make them is the way that they do on the prison rock pile. Make little ones out of big ones.

The trouble with that philosophy is that when you get through breaking up the rock pile, you haven't any more total poundage of rock than you had at the start. In fact, considerably less, because of the waste and loss that is an unavoidable part of any disruptive process.

We agree with the thought that it would be a good thing if we had more little businesses springing up in this country, just as we had before the New Deal instituted its program of industrial and business birth control. But until the birth control is abolished, we are not going to get this increasing proportion of new enterprise that is the hope of our future, just as the little trees of today are the hope of tomorrow's forests.

The chief reason why present-day corporations are getting larger and larger and new small enterprises fewer and fewer is that men with new ideas now find it easier to sell them to strongly financed corporations than to find individual financial backers who will start them in business. This fact was strongly brought home to me a few weeks ago by the experiences related by two men.

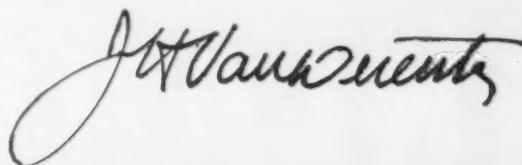
One of them was a research engineer of ability who had devised and developed a product of outstanding promise. The other was an able merchandising expert who had developed an ingenious plan for its sale.

These two men wanted to go into business for themselves. They had the process, the product and the plan which would undoubtedly have resulted in a new and successful small enterprise, if they could have found the capital. But that is where the New Deal birth control stepped in.

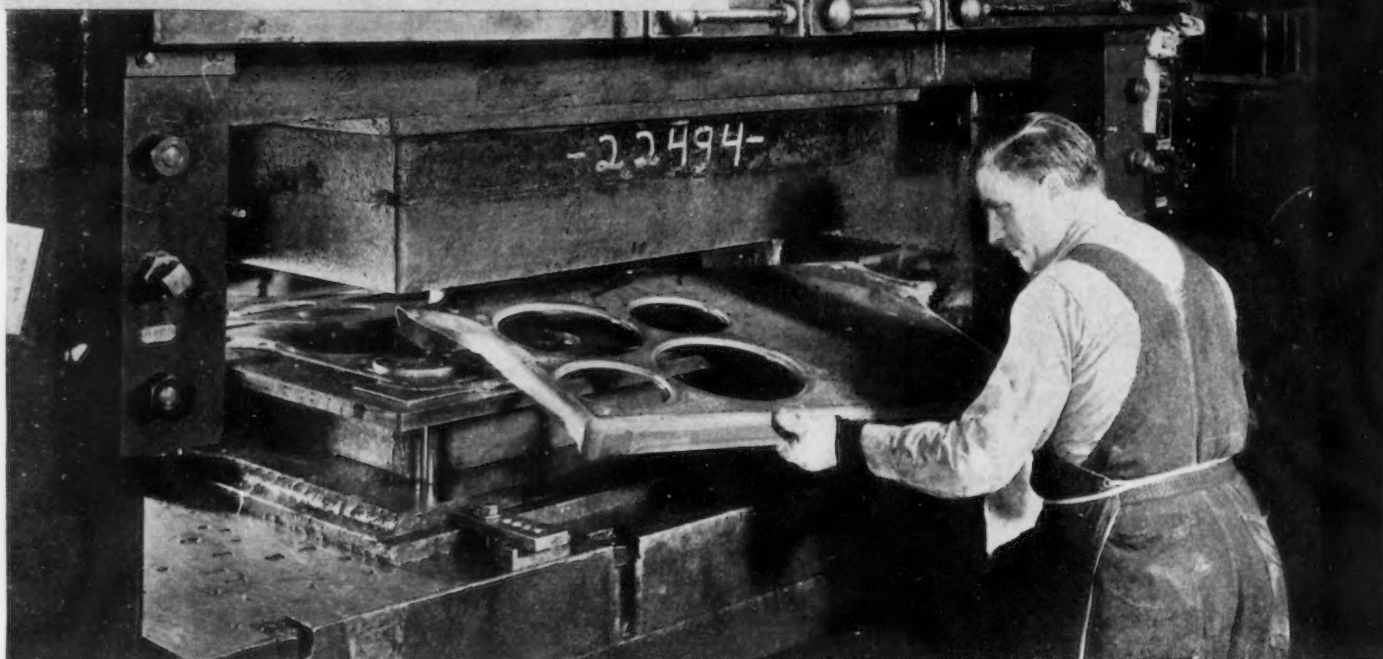
Ten years or more ago, these men would have found a dozen people with money who would have been willing to underwrite their proposed company. Today, thanks to the contraptions manufactured in Washington in the form of confiscatory taxation, obstacles to registration, discriminatory labor legislation, third term uncertainty, and threatened laws to penalize efficiency, these men could not find any individual to take the risk.

So they did what they were driven into doing by the people who profess to want to foster small enterprises and new enterprises, but who actually are forcibly feeding and fattening the large companies. They sold out to an existing corporation and became minor executive employees of it.

We will not encourage new enterprise in this country until we run out of Washington the gang of quack doctors whose own mass production of monstrosities has destroyed the fertility of private enterprise.



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# *How Alloying Elements Affect* **HIGH ALLOY STEELS**

By PETER PAYSON

*Chief Metallurgist, Crucible Steel  
Co. of America, Eastern  
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Harrison, N. J.*

**T**HE author herein summarizes in a very understandable manner the effects which the various elements produce in high alloy steels, and indicates how variations in the properties of these steels are controllable to an appreciable degree. In this, the first of two sections, the functions of alloy additions are described, and detailed data are given for manganese, nickel and cobalt steels.

indebted at least equally to the scientists—Sorby, Osmond, Le Chatelier, Gibbs, Laue, Hull and others—whose discoveries in associated fields helped metallurgists to understand the behaviors of the alloy steels. Throughout the years, writers in various parts of the world have published facts and opinions which have gradually clarified knowledge, so that today it is possible to modify the high alloy steels more or less at will.

The present paper attempts to summarize the effects which the various elements produce in high alloy steels, and to indicate how variations in the properties of these steels are controllable to an appreciable degree.

**T**HE development of alloy steels has been in progress for more than 50 years, but only recently has it emerged from an empirical stage. A great deal is owed to the pioneers—Faraday, Berthier, Mushet, Hadfield, Taylor and White, Mathews, Brearley, Haynes, Benno Strauss, C. M. Johnson, P. A. E. Armstrong—with whose names are associated the high alloy steels. The industry is also

to an appreciable degree on the presence of the primary element.

## Functions of Alloy Additions

Alloy additions to steels are important in several ways. In the first place, they affect the formation of austenite in the steel at elevated temperatures; next, they affect the manner in which the austenite transforms as it cools from elevated temperatures to room temperature; in the third place, they may form carbides, or other compounds, which in turn may affect the manner in which the hardness of the steel changes when the steel is heated in the temperature range between about 400 and 1800 deg. F.; and finally, they may give specific physical and chemical properties to the steel.

**FORMATION OF AUSTENITE:** There are about 20 elements which are alloyed with iron in various combinations in the very large number of steels which are obtainable today. The equilibrium diagrams of the binary alloys of these elements with iron have different characteristics, and the elements have been classified according



to these types of binary diagrams. The most important distinction among these diagrams is the extent of the gamma field, or austenite region. Some elements permit iron to form austenite at elevated temperatures without restriction; whereas other elements permit the formation of austenite up to a definite amount of the element, and beyond this amount, no austenite, but only ferrite, can exist.

The elements of the first type may be called "austenite formers," and those of the second type, "ferrite formers." The latter may also be referred to as those which form austenite loop diagrams. Among the ferrite formers, there are differences in the amount of the element at which the formation of austenite is limited, and these are shown in Table I. The smaller the amount required to limit the formation of austenite, the more active is the element as a ferrite former. There are also shown in Table I the compounds which these elements may form with iron.

When more than one element is added to iron, the effects are generally cumulative. That is, if an austenite-former like carbon, nickel, or nitrogen is added to a gamma-loop alloy like iron-chromium, the limit of the austenite field is extended to larger percentages of chromium. For example, in alloys with very low carbon, no austenite can be formed when more than about 15 per cent chromium is present; whereas, when the carbon is as high as 2.0 per cent, an appreciable amount of austenite can be formed even though as much as 30 per cent chromium is in the steel. On the other hand, when an active ferrite-former like titanium, or columbium, or aluminum, is added to a gamma-loop alloy, the austenite field is contracted. For example, a 6 per cent chromium steel with low carbon will be entirely austenitic at high temperatures; whereas, a steel of similar analysis, but containing only about 1.5 per cent aluminum will have a very little austenite at high temperature.

### Transformation of Austenite

Austenite forms while the steel is cooling from its molten condition, and it may of course also be formed when the steel is reheated to elevated temperatures. Since the steel is nearly always used at room temperature, or close to room temperature, the manner in which the austenite, which formed at the elevated temperature, changes as it cools to room temperature, is of extreme importance in establishing the usefulness of the steel.

Bain, Davenport, and others, have

shown that the austenite of plain carbon steels may be made to transform at any temperature below the critical, and that the product of the transformation of austenite depends on the temperature at which this transformation takes place. If the transformation occurs at a high temperature, the product may be pearlite, or spheroidite, both of which are relatively soft. If the transformation occurs near room temperature, the product is martensite which is quite hard. Bain and Davenport also showed that the rate at which austenite transforms varies with the temperature at which the transformation takes place; that austenite, of carbon steels, transforms very rapidly at temperatures between about 1100 deg. and 900 deg. F. during cooling to room temperature, but if it avoids transformation in this temperature range, it will transform at temperatures below about 300 deg. F.

In order that its transformation at the higher temperature be prevented, the austenite of a plain carbon steel must be cooled very rapidly through this temperature region so that it may form martensite at the lower temperature. For this reason, plain carbon steels, to be hardened, are quenched in water from temperatures above the critical; but the transformation at the temperatures around 1100 deg. to 900 deg. F. is so rapid in some plain carbon steels that even a quench in a *brine spray* from a temperature of 1500 deg. F. will not cool the center of a 1-in. diameter bar fast enough to prevent this high temperature transformation. Consequently, only the outside of the bar is transformed to hard martensite, and the core consists of the fine pearlite formed at about 1000 deg. F. during cooling.

When the austenite contains alloying elements in addition to carbon, the rate of its transformation at the higher temperatures is slowed up appreciably. This is true of all elements present in fairly large amounts, with the exception of cobalt. When, for example, the austenite contains about 1.5 per cent manganese in addition to about 0.90 per cent carbon, it becomes so slow to transform at the higher temperatures that even the cooling at the center of a 2-in. round quenched in *oil* from 1500 deg. F. is fast enough to avoid any high temperature transformation, and the center transforms only at low temperatures, and therefore forms martensite, or a very similar structure. The addition of the alloy element has thus made the steel "oil hardening" by slowing up the rate of austenite transformation in the higher temperature region.

The further addition of alloying elements may retard the high temperature transformation of austenite to such a degree that even air cooling is sufficiently rapid to avoid the high temperature transformation. For example, if the austenite contains about 12 per cent chromium, and 1 per cent molybdenum in addition to about 1.5 per cent carbon, it will take so long to transform at high temperatures, that even the cooling rate at the center of a 5-in. round cooled in *air* from 1800 deg. F. will be fast enough to miss the high temperature transformation, and the austenite will finally transform at low temperatures to martensite, or a similar structure. In other words, the addition of these alloying elements has made the steel "air hardening."

The time required for transformation to take place at various temperatures is clearly depicted in the transformation temperature-time curves, introduced by Bain and Davenport as S curves. Three types of such curves are shown in Fig. 1. The dotted curve represents an SAE-1050 steel, and has the familiar S shape, with very short reaction times in the region between 1100 deg. and 900 deg. F. A steel with such a curve must be quenched in water in order for any martensite to form even at the outside of the bar.

The dash curve (Fig. 1) shows the transformation behavior of SAE-4340. This shows slow reaction rates at high temperatures, and therefore it is unnecessary to quench such a steel in water in order to avoid the formation of soft products. However, this steel has fairly rapid transformation in the temperature region around 900 deg. to 700 deg. F., and medium size bars, say between 3 and 5-in. diameter, when oil quenched, or smaller size bars, when air cooled, will transform to this intermediate temperature product, rather than to martensite.

Finally, the full line curve (Fig. 1) shows the reaction rates of 18-4-1 high speed steel after a heating at 2350 deg. F. Here the reaction rates are slow both at high temperatures and low temperatures, and a steel with such a curve may be hardened to martensite, or a similar structure, either by an oil quench, or an air cool, even in large sizes.

### Austenite Is Retained

In most of the steels which are oil hardening, or air hardening, a good deal of austenite is retained as such at room temperature, even though most of it transforms to martensite. This retained austenite can be changed to martensite by tempering the steel. In

the 1.0 per cent carbon, 1.5 per cent manganese oil hardening steel, the tempering of the retained austenite to martensite occurs at about 350 deg. to 450 deg. F. In high speed steel, it occurs at about 1000 deg. to 1100 deg. F. In a chromium-nickel-silicon valve steel it occurs at about 1400 deg. to 1600 deg. F.

Further alloy additions may make the austenite so sluggish that it will not transform to high temperature

An example of this is an 18 per cent chromium, 5 per cent nickel steel with low carbon. Finally, there are austenites which will not transform even at liquid air temperatures, but some of these, like the well known 18 per cent chromium, 8 per cent nickel, steel may be made to transform at room temperature if they are severely cold worked.

Thus, it has been shown that alloying elements have the very important

follows: The most active are titanium, columbium, vanadium, tungsten, molybdenum, chromium, and manganese, in the order named; iron and cobalt are next; and nickel, silicon, and aluminum are less active than iron.

High temperatures are required to get these carbides to go into solution in austenite, and even when very high temperatures are used, some of these carbides never go completely into solution. However, the martensite formed from austenite which has these elements in solution is resistant to softening because of the re-formation of the alloy carbides at the higher tempering temperatures. These carbide forming elements therefore are valuable in steels to be used at temperatures up to about 1200 deg. F., since they add to the strength, or hardness, of the steel at these temperatures.

There are no commercial high alloy steels which are important because of their ability to be hardened by precipitation of intermetallic compounds, although many such steels have been patented. One commercial steel depends on the formation of the compound FeCr for its resistance to softening at temperatures up to about 1600 deg. F., but in this steel, as will be pointed out later, the compound forms by means of a phase change, rather than by precipitation out of another phase in which it was dissolved, as is the case for all precipitation hardening alloys.

**SPECIFIC PROPERTIES:** The specific properties such as low thermal expansion, corrosion resistance, etc., which alloying elements confer upon steel, aside from the effects they have on the formation, and transformation, of austenite, and the formation of compounds, are sometimes predictable, but frequently they are not. As the various high alloy steels are discussed in the following paragraphs, an effort will be made to point out what may be considered the functional effect of the alloying element, that is, its effect on the structure, and what may be considered the specific effect, or its unique effect on the properties of the steel quite distinct from the structure.

### Manganese, Nickel, Cobalt Steels

One of the oldest alloy steels is the Hadfield manganese steel which contains about 1.0 to 1.4 per cent carbon, and 10.0 to 13.0 per cent manganese. When it is water quenched from about 1830 deg. to 1940 deg. F., it has a structure which is austenitic at room temperature and is relatively soft and tough and non-magnetic. However, when pressure is applied to this austen-

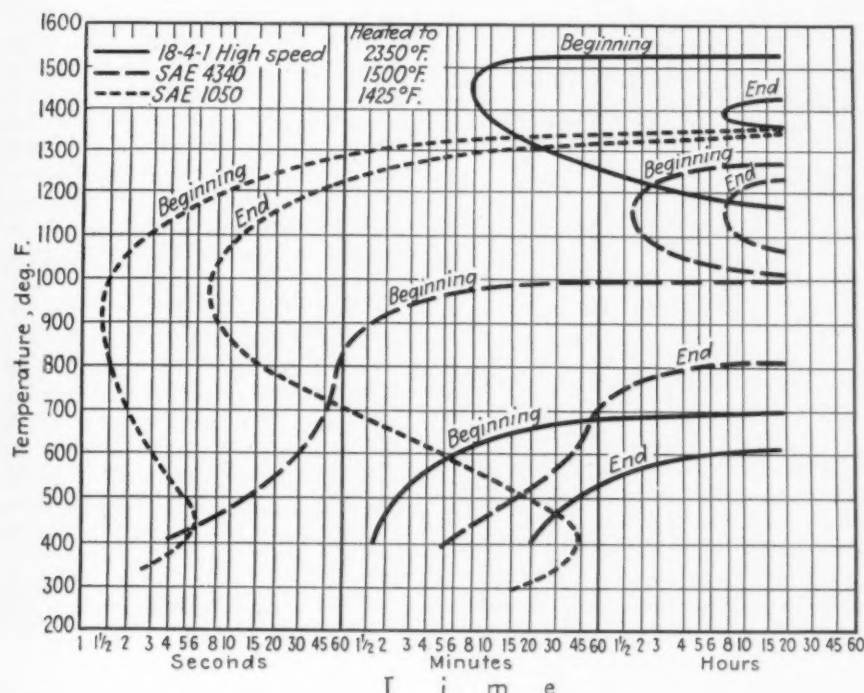


FIG. 1—Transformation temperature-time curves of three different steels.

products even in a furnace cool, but will form only low temperature transformation products. Such steels, for example a 10 per cent nickel steel with 1.0 per cent carbon, have no practical value because they are always martensitic at room temperature, since they cannot be annealed, and therefore cannot be worked or machined.

Then, there are austenites which will not transform even at room temperature no matter how they are cooled, but may be made to transform at very low temperatures, say -100 deg. F.

function of altering the transformation behavior of austenite. The knowledge of the effects of various elements on the transformation of austenite is rapidly increasing due to the publication of papers such as those of Davenport<sup>1</sup>; Parke and Herzig<sup>2</sup>; Griffiths, Pfeil and Allen<sup>3</sup>; and Houdremont and Schrader<sup>4</sup>. Continued work along these lines will make it possible to balance the compositions of steels to produce austenites which will transform according to particular requirements.

**FORMATION OF COMPOUNDS:** Alloying elements, because of their ability to form complex carbides, or intermetallic compounds, may cause steels to resist softening by tempering, or actually to increase in hardness, because of the precipitation of these compounds at heating temperatures usually between 600 deg. and 1400 deg. F., but sometimes up to 1800 deg. F. The tendencies for elements to form carbides, according to Bain<sup>5</sup>, are as

<sup>1</sup>E. S. Davenport, "Isothermal Transformation in Steels", Transactions A.S.M., vol. 27, December, 1939, p. 837.

<sup>2</sup>R. M. Parke and A. J. Herzig, "Hardening of Molybdenum S.A.E. Steels", Metals and Alloys, vol. II, January, 1940, p. 6.

<sup>3</sup>W. T. Griffiths, L. B. Pfeil, and N. P. Allen, "Intermediate Transformations in Alloy Steels", Metal Progress, August, 1939, p. 158.

<sup>4</sup>E. Houdremont and H. Schrader, "The Effect of Molybdenum in Carbon Steel in Comparison with Other Carbide Forming Elements", Techn. Mitt. Krupp, vol. 2, No. 4, 1939, p. 23.

<sup>5</sup>E. C. Bain, "Functions of the Alloying Elements in Steel", American Society for Metals, 1939.



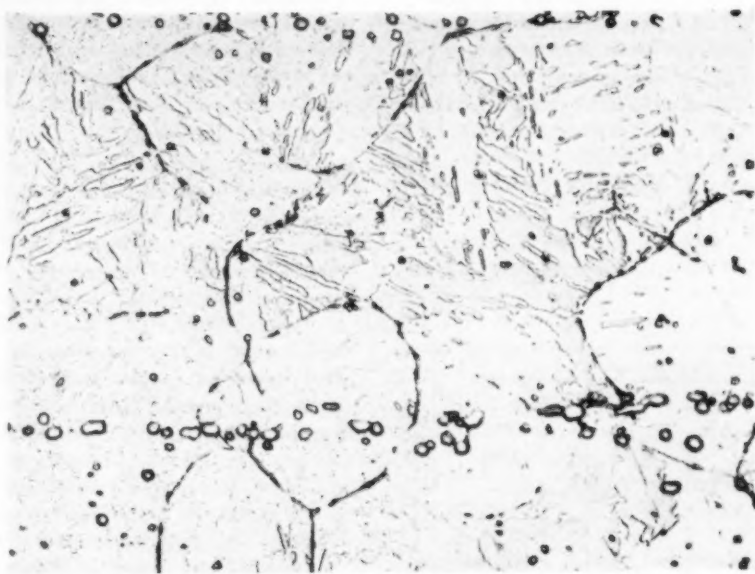


FIG. 2—0.14 C, 20 Ni, 5 Si, 5 Mo steel, air cooled from 2100 deg. F.;  $R_B = 83$ . Ferric chloride etch, and at 1000 diameters.

itic steel, the austenite breaks down very rapidly to hard, brittle martensite. Because of this behavior, this steel has had wide use for wear resistant parts where pressure as well as abrasion is encountered in service, as in jaws of rock crushers. Where abrasion occurs by itself, as in a sand blast nozzle, this steel has only poor wear resistance. In this steel, the alloy additions of carbon and manganese are purely functional in that they establish an austenite at the heat treating temperature which is extremely sluggish, and which does not transform as it is cooled to room temperature.

#### New Steel Developed

Because the austenite of the Hadfield manganese steel is broken down readily to martensite by pressure, this steel cannot be machined by the usual methods since the metal hardens under the pressure of the tool. There are some parts in electrical equipment which are desired to be non-magnetic. The Hadfield manganese steel would be suitable so far as it is non-magnetic and inexpensive, but it is not suitable because it is difficult to machine. Not long ago a steel was developed which contains about 0.40 per cent carbon, 12.0 per cent manganese, 7.0 per cent nickel and 0.20 per cent sulphur, which satisfactorily meets the requirement of very low magnetic permeability, fairly good tensile strength and ductility, rea-

tion of sulphur improved the machinability.

High nickel steels in which the nickel is between about 10 and 25 per cent, have no commercial value because these amounts of nickel cause the transformation of the austenite to be retarded in such a manner that only martensite is formed at room temperature, even though the steel is cooled extremely slowly from a temperature above its critical. For this reason the steel cannot be softened for machining. The higher nickel steels within this range can be retained in the non-magnetic austenitic condition at room temperature but this austenite can be broken down to martensite either by subjecting the steel to very low temperatures, or by reheating it for long times at temperatures under the critical. This behavior can also be brought about by substituting some other transformation retarder like molybdenum for part of the nickel.

#### 20 Ni, 5 Si, 5 Mo Steel

Some entertaining results were obtained with a low carbon steel containing 20 per cent nickel, 5 per cent silicon, and 5 per cent molybdenum. As air cooled from 2100 deg. F., the steel was non-magnetic and had a hardness of  $R_B 83$ . When this material was packed in dry ice and left in it overnight, the steel hardened to  $R_C 40$  and became magnetic. Another piece, which



FIG. 3—Same steel as above, air cooled from 2100 deg. F., and then cooled to  $-110$  deg. F. in dry ice;  $R_C = 40$ . Nital-picral etch, and at 1000 diameters.



had been air cooled from 2100 deg. F., was heated to 1400 deg. F. for about 16 hr., and it also became magnetic, and hardened to  $R_c$  42.

The structures for these three conditions are shown in Figs. 2, 3, and 4. The first represents austenite (with perhaps some cold working effects due to polishing); the second is a low temperature transformation product which definitely resembles bainite; and the third is a tempered product with agglomerated carbides. The last two structures are of approximately the same hardness.

When the nickel in steel is raised to amounts over about 25 per cent, a number of surprising things are found. In the first place, all these steels are permanently austenitic at room temperature, that is, they have the face centered cubic space lattice, but all these high nickel austenitic steels are magnetic at room temperature. Another thing is that the room temperature coefficient of expansion of these steels decreases with increasing nickel up to about 36 per cent nickel, and then increases again with further increase in the nickel content.

**Invar and Elinvar**

This interesting phenomenon was discovered by Guillaume who gave the name of Invar to the 36 per cent nickel steel. He also found that an addition

of about 12 per cent chromium to the 36 per cent nickel caused the steel to have a modulus of elasticity which was not affected by relatively small changes of temperature. This material called "Elinvar," which today has a somewhat modified analysis, is very useful for springs in accurate chronometers. The very high nickel steels also have

an appreciable resistance to corrosion, although they rust in ordinary, as well as in marine, atmospheres.

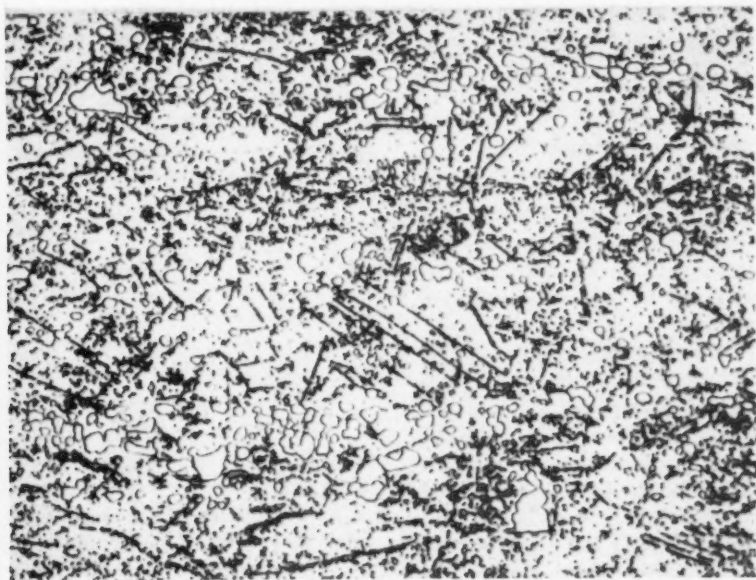
Cobalt is an austenite former like manganese and nickel, but it does not retard the transformation of austenite as they do; on the contrary, Houdremont has shown that cobalt in large percentages increases the rate of transformation of austenite. Steels containing from 17 to 35 per cent cobalt have been used for permanent magnets because of their very high coercive force and high residual induction, but these have been replaced almost entirely during the last few years by the cast iron-nickel-aluminum-cobalt alloys which have even better magnetic properties. Appreciable amounts of cobalt are also used in some high speed steels because cobalt strengthens the martensite. Cobalt additions have also been made to the high nickel steels of low coefficient of expansion to control the coefficients at various temperatures.

These nickel and cobalt steels serve to illustrate the unpredictable specific effects of alloy additions. The discovery and modification of properties such as corrosion resistance, low coefficient of expansion, and high magnetic characteristics, will probably continue to be subject to chance even though other properties of steels become controllable through better understanding of the functional effects of the alloying elements.

*Ed. Note: — Next week the author concludes with discussions on tungsten and molybdenum steels and chromium steels.*

**TABLE I**  
**Classification of Steel Alloying Elements**

Austenite Formers		Ferrite Formers		
Element	Compounds	Element	Percentage Limits of Gamma Loop	Compounds
Boron	$Fe_2B$ ; $FeB$	Aluminum	0.8 to 1.8	$FeAl$ ; $FeAl_2$ ; $Fe_2Al_5$ ; $FeAl_3$
Carbon	$Fe_3C$	Arsenic	1.0 to 1.5	$Fe_2As$ ; $FeAs$ ; $Fe_3As_2$
Cobalt		Chromium	11.0 to 13.5	$FeCr$
Copper		Columbium	0.5 to 1.0	$Fe_3Cb_2$
Manganese		Molybdenum	2.0 to 4.0	$Fe_3Mo_2$
Nickel		Phosphorus	0.3 to 0.5	$Fe_3P$ ; $Fe_2P$
Nitrogen	$Fe_2N$	Silicon	1.5 to 2.5	$Fe_3Si_3$ ; $FeSi$ ; $Fe_2Si_5$
Zirconium	$Fe_3Zr_2$	Titanium	0.5 to 1.0	$Fe_3Ti$
		Tungsten	3.0 to 7.0	$Fe_2W$ ; $Fe_3W_2$
		Vanadium	1.0 to 2.0	$FeV$



**FIG. 4**—Same steel as at left, air cooled from 2100 deg. F., then reheated to 1400 deg. F. for 16 hr.;  $R_c$  = 42. Nital-picral etch, and at 1000 diameters.

# Cadmium Plating

*Latest innovations in plating methods; new uses; cost data; and a review of properties; both protective and decorative.*

By ADOLPH BREGMAN

*Consulting Engineer, New York*

CADMIUM plating is a young art. Although the first patent relating to this process was issued in 1841 in England, it did not come into widespread use until 1919, following the work in this field of M. J. Udy. Since then cadmium plating has grown steadily, although its career has been marked by considerable technical controversy and economic fluctuation.

Cadmium's present importance to industry can be judged to some extent by the fact that the apparent consumption of metallic cadmium rose from 616,000 lb. in 1925 to 5,652,500 lb. in 1937 (dropping back to 4,204,800 lb. in 1938). While cadmium plating was not the only cause of this rise, it was, up to about 1934, the principal outlet for the metal. At that time, however, it was discovered that cadmium-nickel, cadmium-silver-copper and cadmium-silver made excellent bearings for internal combustion engines. In 1937 automobiles alone took a quantity of cadmium estimated at about 1,000,000 lb., causing the worst shortage of metallic cadmium in its history. Coincidentally, of course, the price of anodes skyrocketed from a normal of 55c. to 70c. per lb. to \$1.60 and over,

the average for 1937 being \$1.223. It has since reacted, going down to 55c., only to rise again to 80c. at the end of last year. The reasons for the decline were the usual economic factors—over supply stimulated by high prices, lessened demand, and many users turning to bright zinc for plating at much lower metal cost.

## Properties and Applications

Cadmium plate has as its primary use the protection of other metals against corrosion, rather than decoration, although its appearance is pleasing. Cadmium, like zinc, is anodic or electronegative to iron, protecting it by preferential corrosion. It is slightly less effective than zinc in this respect and does not protect as wide an exposed area of iron. But cadmium has other useful attributes. For example, when used in thicknesses of about 0.0001 in., to protect piano wire against corrosion, it does not impair the tone. It deposits rapidly and at low temperatures, so springs and delicately edged tools are not greatly embrittled by long periods in the plating solution. Such articles can be completely freed from any such tendency by heating for one hour at 350 deg. F.

Cadmium has a pleasing silvery white color with a good lustre and retains its natural satiny sheen under proper conditions for long periods of time. For this reason cadmium is used as the protective coating for any parts which require not only efficient protection but a good appearance. Inside radio parts are cadmium plated as it is preferable to have a coating which does not become discolored and presents an unpleasant aspect to the user who, on occasion, finds it necessary to dig into the works of his radio. A wide variety of small hardware, such as padlocks, hinges, screws, fittings, etc., are cadmium plated and retain their attractive appearance even after long display in the retailers' hands.

The electrochemical equivalent of cadmium is high—2.097 grams per amp. hr., compared with 1.219 for zinc. Thus, cadmium requires, theoretically, only 9.7 amp. hr. to deposit 0.001 in. in thickness for 1 sq. ft., compared with 13.7 amp. hr. to deposit the same quantity of zinc. Cadmium plating solutions have good throwing power, covering irregularly shaped articles well.

In general, therefore, cadmium is an easy metal to plate, giving less

trouble and requiring less care than many other baths. Most platers like to work with cadmium. The baths are less critical, easier to analyze and control; they plate faster, requiring less equipment and floor space. Cadmium covers malleable iron nicely and also zinc base die castings, calling for much less care in removing grease and oxides from the work.

For these reasons, the use of cadmium plate, within a very short time after the development of a commercially feasible process and its introduction to industry, became widespread on casket hardware; structural steel parts which are imbedded in concrete; on automotive bolts, nuts, screws and washers; on builders' hardware; on aircraft parts; in the radio industry for hardware parts; chassis and on marine hardware; in general, on malleable fittings, electrical parts, wire screen, springs, tools, stampings and screw machine parts.

Although cadmium is not generally resistant to chemicals, it has some advantages in this field. Because of its resistance to weak alkaline solutions, like washing soaps and powders, cadmium plate has found wide use on washing machine parts, on floor cleaning machines, mops and clothes wringers. It also serves to protect lavatory

<sup>2</sup>Gustaf Soderberg, Monthly Review of the American Electroplaters' Society, November, 1936, pp. 33-37.

## FOURTEENTH in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

fittings which come in contact with washing soaps.

### Low Contact Resistance

The fact that cadmium plated surfaces can be readily soldered eliminates many problems in the assembly of electrical products, hardware, etc. The ductility of cadmium makes it practical to plate flat blanks and then form them to the desired shape.

Cadmium has low contact resistance and is, therefore, used extensively as a protective coat for electrical contact surfaces. Clean copper is, of course, the best conductor, but its resistance rises rapidly due to oxidation under heat and pressure. The resistance of cadmium rises much less under similar circumstances. For that reason cadmium has served excellently for bus bar joints subject to intermittent heating and cooling.

Another important application of cadmium plate is in products where dissimilar parts are in contact with each other. In the presence of mois-

ture the galvanic currents set up result in corrosion, and in the case of radio sets, in actual interference with reception. Plating the different parts with cadmium prevents this condition. In one instance,<sup>1</sup> cadmium plated rivets in duralumin sheets resulted in much less reduction in strength and ductility of the sheets after exposure, than did rivets made of aluminum, annealed duralumin, tinned steel, heat treated duralumin, 18-8 stainless steel, copper or brass. Cadmium is used to prevent brass from corroding, as the potential difference is less between cadmium and brass than between zinc and brass. Cadmium is also a good protector for brass and steel parts in contact with each other.

Cadmium plate has been used to good effect for machinery in the packing industry, on parts in contact with greases containing oleic and stearic acids. It must be applied with care in such fields, however. It cannot be used in contact with food products due to a danger of poisoning.

Cadmium plate has a field in bear-

## COST AND TIME REQUIRED TO PRODUCE COMMERCIAL DEPOSITS\*

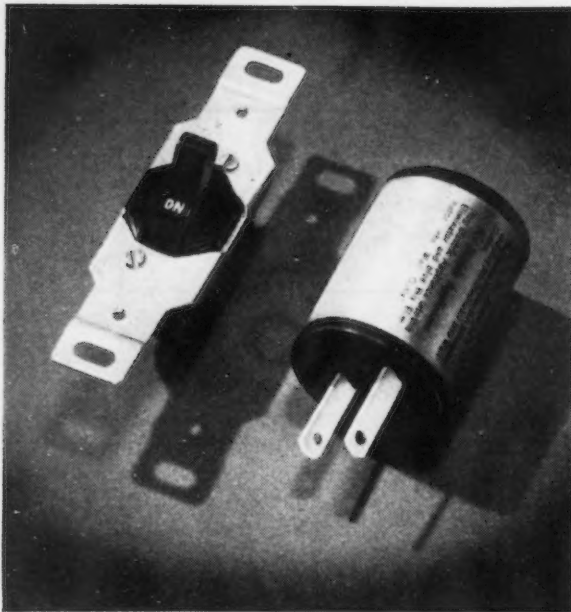
(Based on Current Efficiency of 90 Per Cent)

Electrochemical equivalent = 0.5824 mg. per Coulomb = 0.0733 oz. per amp. hour. Specific Gravity = 8.65. Weight per cu. in. = 0.312 lb.

DEPOSIT		COST		TIME						
Thickness, Inch	Weight, Oz. Per Sq. Ft.	Per Sq. Ft. of Surface		Required in Minutes for Deposits at Various Current Densities						
		Metal at \$1 Per Lb.	Power at 5c Per Kw-hr.	Amp. Per Sq. Ft.						
				10	20	30	40	50	60	70
0.00010	0.072	\$0.00450	\$0.00045	6.6	3.28	2.19	1.64	1.31	1.09	0.93
0.00015	0.108	0.00675	0.00060	9.9	4.92	3.29	2.47	1.98	1.64	1.41
0.00020	0.144	0.00900	0.00090	13.11	6.56	4.38	3.28	2.62	2.19	1.88
0.00025	0.180	0.01125	0.00110	16.4	8.22	5.47	4.11	3.29	2.74	2.34
0.00030	0.216	0.01350	0.00135	19.7	9.83	6.61	4.96	3.98	3.28	2.81
0.00035	0.252	0.01575	0.00160	22.9	11.44	7.66	5.72	4.59	3.81	3.27
0.00040	0.288	0.01800	0.00180	26.7	13.22	8.81	6.60	5.29	4.44	3.81
0.00045	0.324	0.02025	0.00200	30.0	14.78	9.83	7.39	5.89	5.00	4.29
0.00050	0.360	0.02250	0.00225	33.3	16.44	10.91	8.20	6.56	5.56	4.77
0.00055	0.396	0.02475	0.00250	35.6	18.00	12.00	9.00	7.22	5.92	5.08
0.00060	0.432	0.02700	0.00270	38.9	19.67	13.11	9.83	7.89	6.48	5.56
0.00065	0.468	0.02925	0.00290	42.2	21.33	14.22	10.66	8.56	7.03	6.03
0.00070	0.504	0.03150	0.00315	46.7	23.33	15.56	11.22	9.33	7.78	6.67
0.00075	0.540	0.03375	0.00340	48.9	24.56	16.33	12.33	9.83	8.14	6.99
0.00080	0.576	0.03600	0.00360	53.3	26.67	17.78	13.33	10.67	8.89	7.62
0.00085	0.612	0.03825	0.00380	55.6	27.89	18.67	14.00	11.17	9.25	7.93
0.00090	0.648	0.04050	0.00405	58.9	29.44	19.67	14.78	11.78	9.81	8.41
0.00095	0.684	0.04275	0.00430	62.2	31.11	20.78	15.56	12.44	10.37	8.89
0.00100	0.720	0.04500	0.00450	65.6	32.78	22.00	16.44	13.11	10.92	9.37

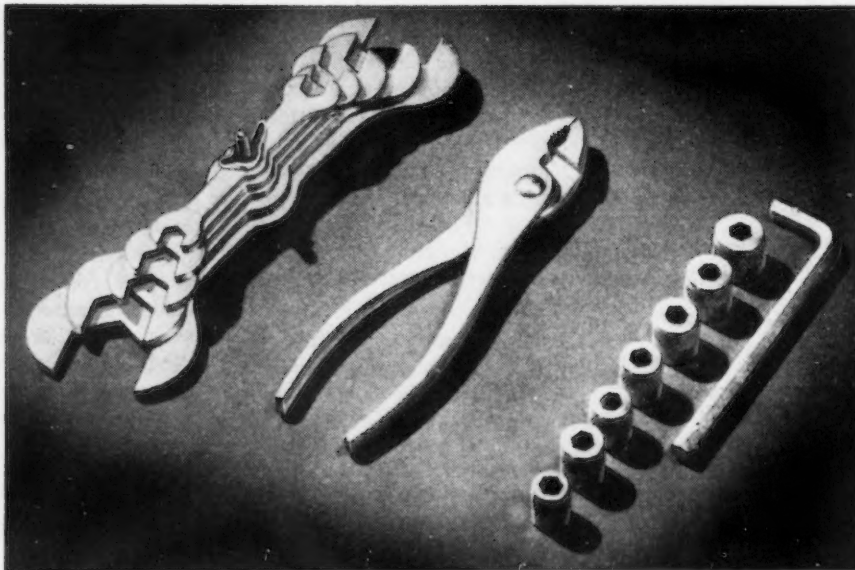
\* From Cadalyte "39", E. I. duPont de Nemours & Co.





ABOVE  
**E**LECTRICAL parts,  
cadmium plated  
for reduced contact  
resistance.

AT RIGHT  
**W**RENCHES and  
pliers, plated  
with cadmium for  
protection.



BELOW  
**T**ACKS and wash-  
ers, cadmium  
plated (in barrels)  
for rust resistance.

ings. It is used in ordinary commercial thicknesses for cheap ball bearings, worm gears and ball joints. It can be produced in smooth coats in thicknesses up to 0.03 in. In this connection an interesting development is proceeding in the work of the Udylyte Corp. on ductile cadmium coatings. According to U. S. patent 2,107,806, deposits are produced with high ductility in thicknesses ranging from 0.0025 mm. (0.00085 in.) to 0.75 mm. (0.0255 in.) or more. It is stated that sheet steel coated with even 0.75 mm. (0.0255 in.) can be bent repeatedly at 180 deg. angle without any evidence of cracking of the cadmium coating. The plate obtained is very similar to a tin plate except, of course, for the higher melting point of the cadmium. Tests on diesel engine motor pistons have shown very promising results.

Deposits of this character are pro-

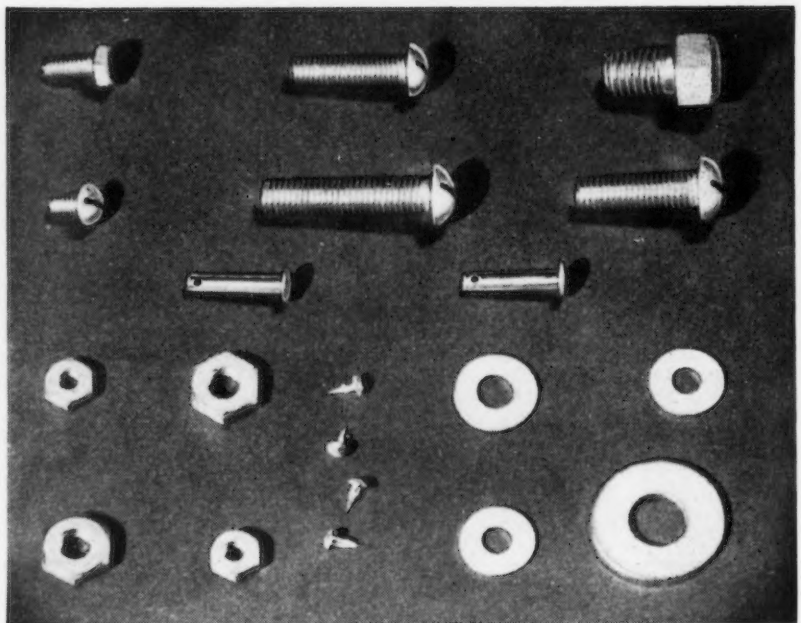
duced by the use of new addition agents in the plating solution and by the control of pertinent factors in the plating operations as described in the patent just cited.

Ductile deposits have also been produced by the Cadalyte process of E. I. du Pont de Nemours & Co., for some time. For instance, cad-

mium coatings of a few ten-thousandths on wire remain intact as a covering on the wire even when it is drawn to one-fifth its original diameter. Also, relatively thin cadmium coatings from Cadalyte remain on sheets rolled out to four times their original surface area.

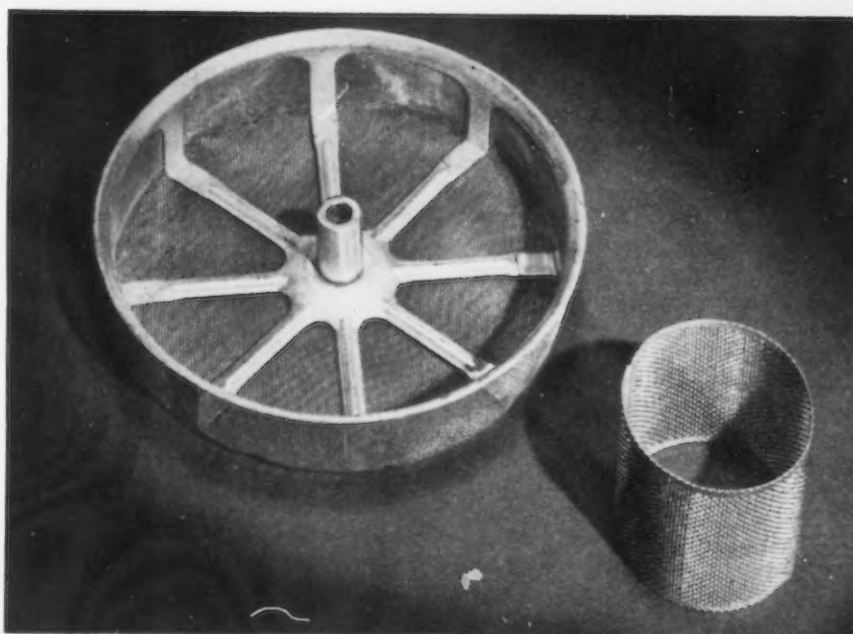
#### Corrosion Resistance

As already stated, the primary use of cadmium is as a protector of other metals from corrosion. On the subject of its efficacy in the protection of iron and steel, controversy raged for several years and has only recently settled down. Cadmium originally stepped into the limelight because of its extremely favorable showing under the



salt spray test. Experience has shown, however, that the salt spray test is far from an infallible index and the results of long-time exposure tests have demonstrated that cadmium plate has decided limitations.

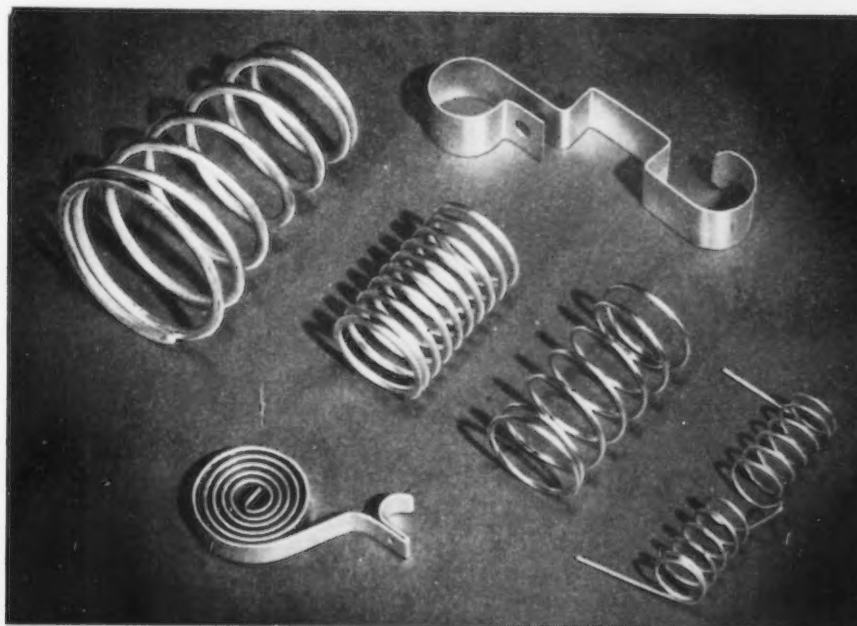
Cadmium chloride, which is formed in the salt spray, has a low solubility compared with zinc, for example. Since cadmium chloride is similarly formed by corrosion in marine atmospheres, it seems to follow that cadmium should stand up well under these conditions. That the results of service tests did not equal those of the salt spray tests proves that other compounds are also formed under exposure, with higher solubility than cadmium chloride, and for that reason corrosion proceeds much faster.



ABOVE

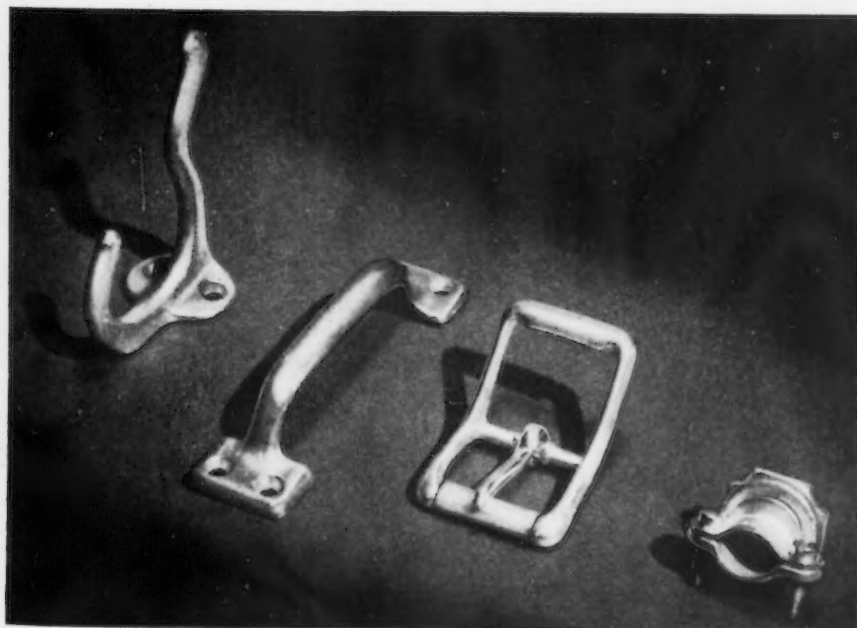
**C**ADMIUM plate for screens. Good throwing power puts metal into the interstices.

BELOW  
**M**ISCELLANEOUS hardware coated with cadmium, for protection and good appearance. All photos courtesy of the Udylite Corp.



AT LEFT

**S**PRINGS protected by cadmium plate without loss of temper.



In industrial atmospheres, where sulphates are among the corrosion products, cadmium shows a low resistance to corrosion because of the high solubility of cadmium sulphate. However, it has been pointed out that the corrosion products of cadmium do not accumulate like those of zinc and it is sometimes necessary to use cadmium in order to keep exposed mechanisms working smoothly.<sup>1</sup>

Cadmium plate operates to best advantage in indoor service in air of moderate to low humidity. Where the humidity is high, it is less effective, but according to Clarke,<sup>2</sup> it does well.

Although cadmium may be applied by other methods, such as spraying and

<sup>2</sup> "The Atmospheric Corrosion Resistance and Protective Value of Metallic Coatings," by S. G. Clarke, a paper read at the London Conference of the Electrodepositors' Technical Society, May 17, 1939.



perhaps even by hot dipping, the method in almost universal use is electro-deposition in still tanks or in barrels. The solutions are cyanides made up with cadmium oxide and sodium cyanide, or with cadmium cyanide. Many commercial solutions at the present time are prepared from proprietary salts containing cadmium salts, cyanides and brightening agents, such as Cadalyte (E. I. du Pont de Nemours & Co.), Cadux (Hanson-Van Winkle-Munning Co.) and Udylyte (Udylyte Corp.). A typical bath for still plating may be made up as follows:<sup>3</sup>

Sodium cyanide .....6.5 oz.  
Cadmium cyanide .....5.5 oz.  
Sodium hydroxide .....2.7 oz.  
Water .....1.0 gal.  
An alternative bath contains:  
Cadmium oxide..... 4 oz.  
Sodium cyanide .....10 oz.

Temperatures may range from 70 deg. to 110 deg. F.; current densities from 10 to 50 amp. per sq. ft.; voltage, 2 to 2½. Anodes should be pure cadmium, but in many instances steel anodes are also used, in the proportion of three of cadmium to one of steel.

Arsenic, antimony, lead, silver and tin must be kept out of the solution to avoid dark, rough and spongy deposits.

Numerous addition agents are recommended as brighteners, such as gulac, molasses, gelatin, dextrine, grain extract, and other organic compounds. Nickel in minute quantities may also be used. Many of these agents are covered by patents in the proprietary mixtures just named. Addition agents act not only as brighteners by reducing the grain size of the deposits, but also improve wear resistance because of the increased hardness of the deposits. According to Soderberg<sup>4</sup> the hardest plates are always found within the bright range of the solution. The hardness is also increased with decreasing cadmium; decreasing sodium cyanide (only in the presence of nickel); increasing grain extract content, particularly when cadmium is low; by increasing the nickel content, particularly when cadmium and sodium cyanide are low.

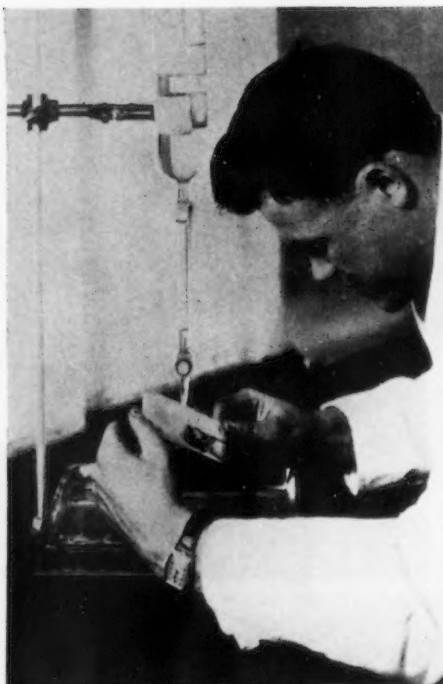
Acid cadmium baths have been developed for producing highly adhesive plates, which have been covered by patent applications.<sup>5</sup> They are intended primarily for flash coatings to be used prior to coating from cyanide baths.

<sup>3</sup>"Principles of Electroplating and Electroforming," by Blum and Hogaboom.

<sup>4</sup>"The Cyanide Cadmium Plating Solution," by Gustaf Soderberg, a paper presented at the first International Electrodepositors' Conference of the Electrodepositors' Technical Society, March 3, 1937.

<sup>5</sup>Private communication.—Gustaf Soderberg.

<sup>6</sup>Private communication.—W. A. Geiger.



**M** EASURING the thickness of cadmium plate by the Hull and Strausser method. Photo courtesy of Hanson-Van Winkle-Munning Co.

Good adhesion can be obtained to stainless steel and certain aluminum alloys. There also appears to be a place for thin acid cadmium coatings on ordinary steel. Apparently there is always some oxidation of the steel prior to immersion in the plating bath. This oxidation is not removed in cyanide baths. Low pH baths provide the maximum adhesion.

Work has also been done<sup>6</sup> on the bright plating of cadmium, which is centered around the development of methods of purification of baths which have become contaminated in service.

Recent developments in bright cadmium plating have included facilitating maintenance by incorporating the brightening agents with sodium cyanide so that the brightening agents are automatically added to the solution.<sup>6</sup>

A large proportion of the commercial cadmium plating is done in barrels. This type of work may be conducted under widely varying current densities and voltages, ranging from 7 to 12 volts and from 175 to 500 amp. per barrel. Higher voltages are used with higher concentrations. It is difficult to measure current densities in barrels due to the variation in the effective cathode area; only a part of the load in the barrel is in the circuit at any given time. The solutions used in barrel work contain about the same metal and chemical content as the still solutions.

The equipment used for cadmium plating is of the conventional type used in most plating operations. Tanks should be of steel, welded and reinforced. No lining is needed although rubber may be used. Lead should not be used. For plating barrels, hard rubber (free from sulphur) is recommended, although Formica, Bakelite and other synthetic compositions can be used. Bus bars should be large enough to allow for 2 amp. per gallon of still solution and 3 amp. per gallon for barrel plating (1 sq. in. cross-section of copper bus bars will carry about 1000 amp.). The solutions are generally kept at their proper operating temperatures, 70 deg. F. to 95 deg. F. by cooling coils.

One precaution is important in practical operations. In handling barrel plated work, the work should be dumped out of the barrel before rinsing it. Rinse the work only, never the barrel. Rinsing the barrel greatly increases the drag-out losses.

Numerous tests are available for measuring the thickness of cadmium plate, such as microscopic, stripping, etc., but the one in most general use is the dropping test developed by Hull and Strausser. A given solution (110 grams of ammonium nitrate and 55 cc. of concentrated nitric acid per liter of water) is allowed to drop at a uniform rate (90 to 110 drops per min.) on the test piece mounted at a 45 deg. angle so that the solution runs off quickly. The time required to perforate the coating (usually determined with a stop watch) gives a direct measure of the plate.

In estimating the cost of cadmium plating,<sup>5</sup> it may be figured that 1 lb. of cadmium will cover approximately 100 sq. ft. of surface with an average coating of 0.0002 in. (This figure includes average drag-out.) At the present price of cadmium, 80c. per lb., the cost of the metal is, therefore, about 0.8c. per sq. ft. The cost of chemicals and electric current, including cleaning and pickling, runs something on the order of 50 to 75 per cent of the cost of the cadmium. Naturally, with heavier cadmium coatings the percentage decreases in proportion, as the cost of cleaning and pickling chemicals is fairly independent of plate thickness.

Labor costs, of course, vary with every job. However, it may be estimated that one man can handle as much as nine barrel loads per hr. with the proper equipment.

The accompanying table gives the cost and time required to produce commercial deposits in still tanks under specific conditions.



# PROTECTIVE LIGHTING

By J. A. SUMMERS

General Electric Co.

Nela Park Engineering Department  
Cleveland

o o o

THE F. B. I. has received thousands of complaints of sabotage and espionage at industrial plants filling Government contracts, and consequently every possible defense measure is necessary to protect such plants. Many of the methods of destruction require a certain amount of time to prepare, and under cover of darkness this may be done more easily.

Particularly vulnerable locations are along railway tracks, along highways, near a woods or heavy undergrowth which furnishes concealment, dead-end streets at the property line, steep banks inside or outside of fence, entrances to the property, around important buildings where entrance may be forced, and behind stacks of material.

No one method of protection will serve all purposes, but proper lighting is of great help and the principle to keep in mind is to direct the light where it will help the guard most from his point of observation.

A high fence around the property line is usually considered necessary. The fence should be painted white or a light color so that a trespasser may readily be seen in silhouette against it and lighted by means of floodlights or local units.

One of the best methods of lighting the fence line is to locate a narrow beam floodlighting projector equipped with a 1000-watt lamp at each corner and place additional projectors at intervals not exceeding 300 ft. between the corners, as shown in accompanying sketch. The projectors should be mounted 10 to 15 ft. high and if there is a guard on patrol all projectors should be pointed in the direction in which the guard walks so that the light does not shine into his eyes. If the guard is at a fixed post, the projectors should point away from his station. In many cases it is advantageous to have the guard on a fixed platform the same height as the projectors, thus giving him an unobstructed view of the entire area as well as lessen the danger of a stealthy attack.

If the fence is of the open type and

easily seen through, it may be desirable to project the light outside the fence line so that the edge of the beam is along the fence. A guard on patrol will then command a wider area of approach while remaining in relative darkness himself.

A second method consists of local units equally spaced around the fence. There are many special types, which, if properly installed, will do an excellent job. The most common are the RLM Dome and wide-angle refractor. They should be mounted 20 to 25 ft. high and spaced not more than 75 ft. apart. Two-hundred to 500-watt lamps should be used depending on the vulnerability of the location. If only local units are used, there should be supplementary floodlights at strategic locations which are controlled by the guards. This gives desirable flexibility in that the unit may be directed to any point where an emergency may require light in a hurry.

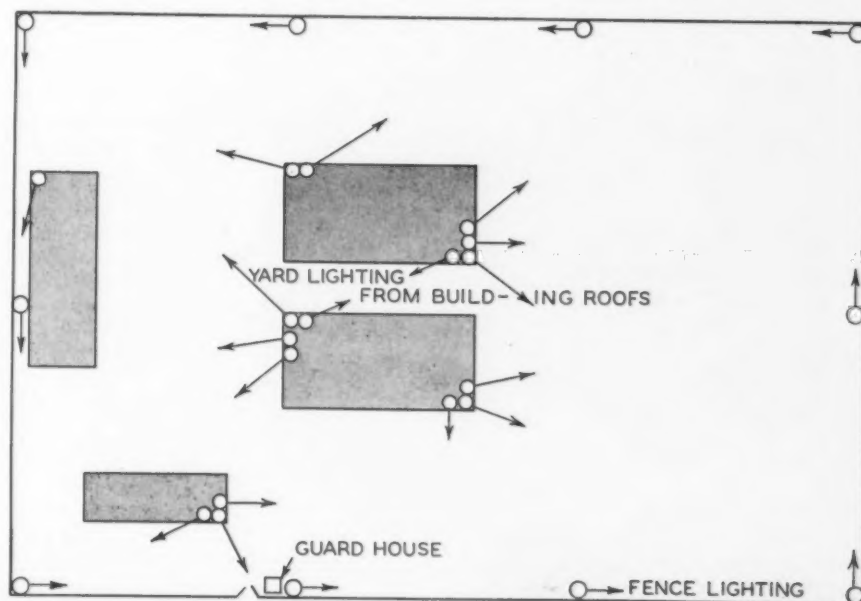
Satisfactory protection may also be obtained by lighting the entire yard provided care is taken in locating the lighting equipment. In open yards, where there is little obstruction, it is a simple matter to light the yards by placing projectors on the roofs of buildings and directing the light toward the boundary line, being careful, of course, not to direct light toward the guards. For short distances up to about 200 ft. wide beam projectors should be used and for the longer distances medium or narrow beam equipment. If contrasts are reasonably

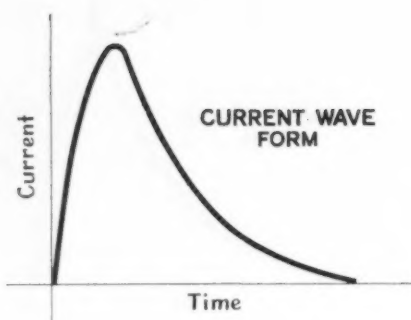
good, narrow beam projectors with 1000-watt lamps can be used effectively up to 600 ft. and even beyond under favorable conditions.

Where there are large piles of material, small outlying buildings, or other obstructions which may throw long shadows, great care must be taken in placing the projectors so that there will be no shadows to serve as hiding places for trespassers. In many cases shadows can be eliminated by directing the light toward the obstruction from two directions. In other cases it is necessary to place a local light on a pole near the obstruction.

Buildings near the fence line should receive particular attention as they serve to obscure anyone scaling the fence at the point unless special lighting is provided. The area between building and fence should most certainly be well lighted. Areas around freight cars in the yard should also be well lighted for these provide good hiding places from which small groups can operate.

All entrances should be well lighted so that approaching persons can be closely scrutinized by the guard. It is also good practice to provide lighting for an appreciable area around entrances so that if an intruder succeeds in getting past the guard he will not be immediately lost in the veil of darkness. Floodlighting projectors on roofs of nearby buildings furnish good supplementary lighting around entrances, provided they can be properly located so as not to be too glaring to the guard.





# SPOT WELDING

**U**P until very recently the electric spot welding of heat treated aluminum alloys such as used in the construction of airplanes has been accomplished with considerable difficulty. Frequent changing of welding tips has been necessary due to the pickup of aluminum on the tip sur-

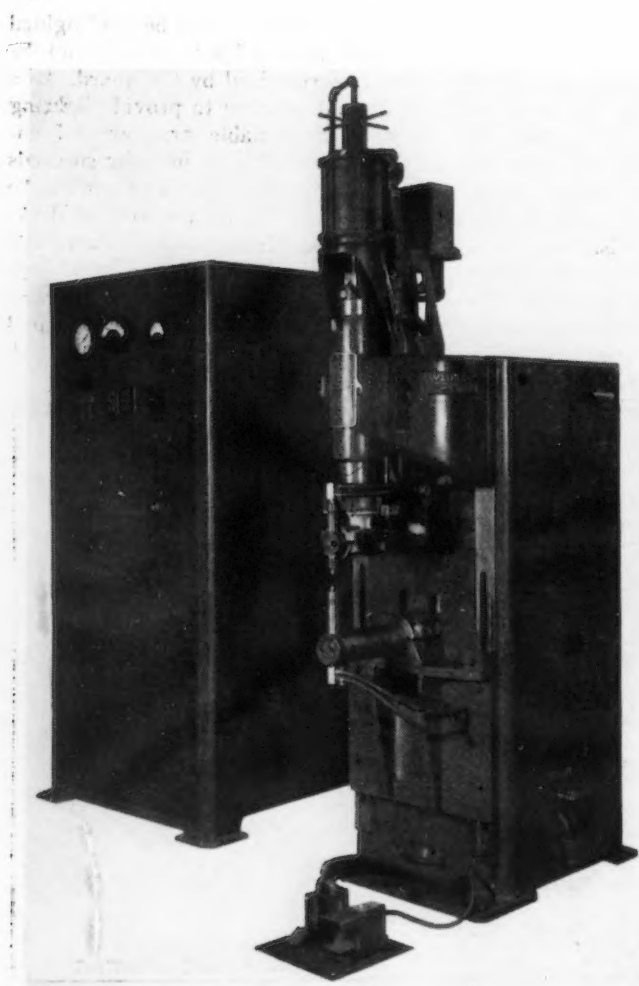
faces, the finished welds have had a tendency to develop large cracks, and undesirable indentations have been produced in the sheets. One of the greatest drawbacks on existing aluminum spot welding equipment, however, has been the excessive kva. demand during weld. Table I gives an idea of

the magnitude of this demand for various gages of material and throat depths, based on currents recommended for welding 24 ST alclad with conventional equipment.

There are several ways in which these difficulties may be overcome. As applied to conventional single phase a.c. welding machines, the demand may be very much reduced by installing series capacitors which bring the load on the line to unity power factor and hence equivalent to the kw. demand of the welding machine. For large machines, however, the required capacitor bank becomes quite expensive, and the load on the line is still a single phase intermittent one. Another method is to use a motor-generator set, which uses its flywheel effect to store energy between welds, and the actual line load becomes a three phase, high power factor load with a minimum of fluctuation. This equipment is even more expensive than the equipment mentioned above, and considerable power is lost in overcoming the losses of the motor-generator set. On the other hand, neither of these two systems offer any solution to the problem of weld quality and tip pickup.

A third method of storing energy is in the magnetic field of an inductance through a direct current charge. This is the method used in the Sciaky machine described in *THE IRON AGE*, March 21, p. 33.

Yet another method, and the principle used in the design of the Hi-Wave welder, recently developed by the Taylor-Winfield Corp., Warren, Ohio, is to charge a capacitor bank to a predetermined voltage by direct current and then instantly discharge it into the conventional welding machine



ONE of the newest machines for the spot welding of aluminum alloy sheets with low power input is this Taylor - Winfield Hi-Wave welder capable of welding all the commonly used gages. The model shown has an 18-in. throat and is equipped with a retractable stroke cylinder and dynamic pressure system incorporating a so-called air lock or cushion. All the control equipment is housed in the cabinet at the left.

# ALUMINUM

## BY HI-WAVE WELDER

primary transformer circuit. It is possible to arrange the circuit so that the charging of the capacitor may be taking place during the entire time interval between successive welds, thus reducing the power demand to a minimum. By making use of high voltages and all three phases of the power line, small, low cost rectifier systems may be used for charging the capacitor bank, resulting in high power factor, and a low kva., balanced load on the line. Table II gives the corresponding kva. demand on a Hi-Wave welder for the same aluminum gages and machine throat depths as for conventional machines tabulated in Table I.

### Wave Form of Welding Current

Heretofore, 60 cycle, single phase current usually has been used, giving a definite sine wave of secondary current of 60 cycles because this was the type of shop power most generally available with which to run the machine. Recent studies at Taylor-Winfield, on the other hand, have indicated that for welding aluminum, this is not the most desirable wave shape. First-class welds in aluminum and its alloys are best obtained from a current wave with a steep front in which the maximum value of current is reached rapidly, followed by a slower decay to zero. A steeper wave front was found to be required for lighter gages than for heavy sheets. For some conditions, an oscillating discharge has been found desirable. By properly adjusting the capacitance, inductance and resistance of the condenser discharge circuit, a wide range of wave forms may be selected. Magnitude of the welding current for any given wave shape is governed then simply by adjusting the

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**W**HEN using single phase a.c. resistance welders for aluminum alloy sheets, the high conductivity of the alloy plus the inherently low power factor of the conventional unit has resulted in an extremely high kva. demand on the shop lines, especially if many welders are in use. The answer has been stored energy systems, such as the one described here, in which three phase current is recti-

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fied and used to charge a capacitor over a relatively long period of time, later to be discharged in a brief instant through a conventional welding transformer. Control of the wave form of the transient current set up, plus new and higher values of accurately controlled pressure at the electrodes, has resulted in sound welds, free from cracks, with relatively low power demand on the line.

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voltage to which the capacitor bank is charged.

In order to increase the flexibility of wave form selection, a new circuit has been jointly developed by the Taylor-Winfield Corp. and the Raytheon Mfg. Co., involving the addition of a rectifier in shunt with the inductance in the ordinary circuit of the welder primary. Then if the circuit constants are adjusted for what would be an oscillatory discharge, the rectifier prevents the oscillation from taking place since it constitutes a "short" across the capacitor at the time the voltage wave starts to reverse on the capacitor. This results in a wave form having a front identical with the first quarter cycle of an oscillatory discharge, then decaying along an exponential curve to zero.

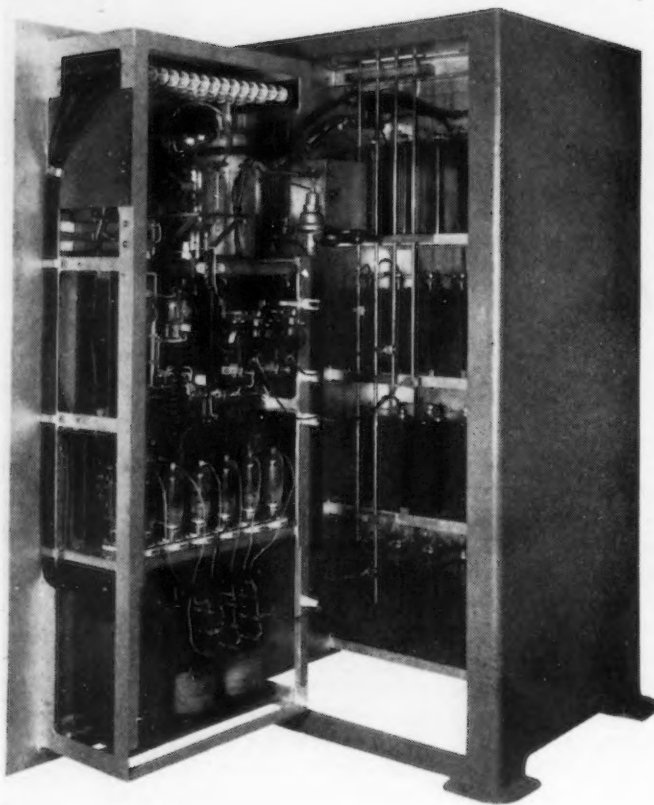
When this form of welding is used it is possible to employ flat electrodes on both sides of the sheets to be welded. Flat tips result in a uniform pressure and a uniform density throughout the spot, giving in turn a uniform structure with very little depression on either side of the sheet and substantially without cracks.

On conventional welding machines, in order to use a minimum of current, the welding pressure is kept low because of the high conductivity of aluminum. Since the Hi-Wave system permits obtaining any desired value of welding current without excessive power demand, it has been possible to determine optimum welding pressures from the point of view of weld soundness alone.

### High Welding Pressure

These values Taylor-Winfield finds to be about two and a half times the pressures used in the past, and the company believes the use of high pressure is a major factor in the elimination of cracks in welds. Furthermore, there is a large improvement in the ratio of tensile strength to single shear strength—an important factor. It has also been found that with the combination of high pressure, flat tips and the wave shape described, pickup on the welding tips is greatly reduced, materially increasing the number of welds made between dressings. Long tip life is valuable from the operating





THE capacitors which are the reservoirs for the electrostatic storage of energy for the Hi-Wave welder are mounted in the rear of the control panel, shown with the door swung open to the left. Included on the panel are the three phase rectifier transformer, rectifier tubes, resistance units and auxiliary control apparatus. The high potential circuits are de-energized when the door is opened.

point of view, as is, of course, the low peak power demand.

### Equipment Available

In general, what the Taylor-Winfield Corp. is offering for aluminum spot welding are its standard machines modified by the addition of a special pneumatic pressure system and retractable stroke cylinder for facilitating the insertion of flanged shapes between the tips, plus a compact unified control system housed in a separate cabinet, which also contains the capacitor units at the rear. This control unit includes the necessary circuit breakers, air pressure regulators, air gages, line ammeter, capacitor voltmeter, sequencing control and all other auxiliary control equipment. All necessary adjustments controlling the time, current and pressure are centralized in this unit and are readily made.

Upon installation, it is only necessary to interconnect the welding machine to the single control unit and connect an air line, water line and a low capacity three-phase power line to the control unit. The equipment is designed for operation on either 220 or 440 volts, 50 to 60 cycles. Although the condenser bank may be charged to several thousand volts, the unit is interlocked so that it is impossible to open the doors without first de-ener-

gizing the high voltage circuits. Furthermore the internal power supply is metalically grounded at all times. A separate 24-volt circuit is provided through which the foot switch of the welding machine operates.

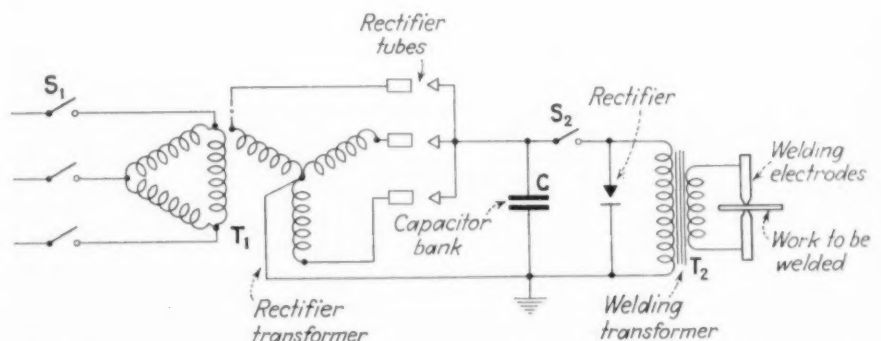
High quality condensers are used in which the capacity does not vary as a function of life, operating voltage, temperature or any other effect. To accurately control the voltage to which the capacitors are charged, an automatic circuit is incorporated that disconnects the units from the charging circuit when the voltage has reached

its selected value. The discharge function is also handled automatically as will be described later.

### Upper Electrode Movement

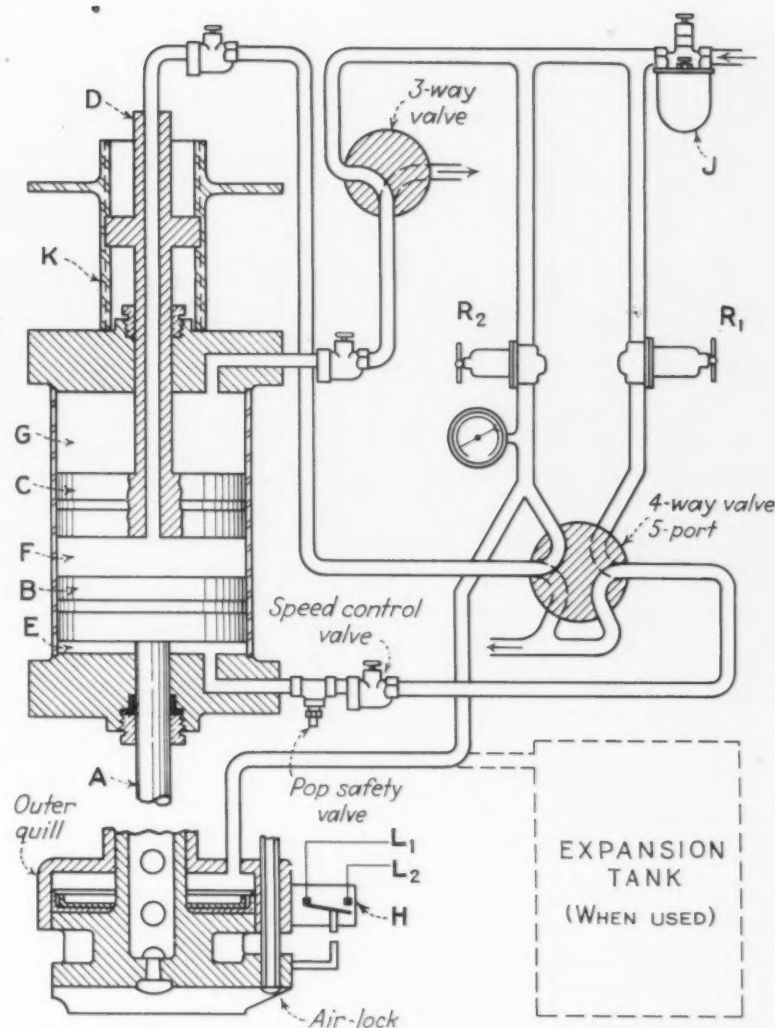
In the welding of aluminum, even with improved control equipment, it is necessary to change tips frequently as compared with spot welding steel, and a wide opening is therefore convenient, although for fast operation the stroke should be kept small. It also must be possible to open the electrodes a sufficient distance to introduce flanged members. For these reasons, practically all welding machines specifically designed for aluminum have some means for the rapid retraction of the upper electrode independent of the welding stroke mechanism. In the Taylor-Winfield Hi-Wave welder, a special double piston type operating cylinder is used for this purpose as indicated in the schematic diagram. This system is used in conjunction with a quill and a so-called air lock, the chief purpose of which is to provide a freely moving dynamic system of low inertia and low friction so as to obtain good quality welds free from cracks.

In operation, the overhead air cylinder moves the inner and outer quill assembly down as a unit until the electrodes (attached to the inner quill) come in contact with the work. At this point the inner quill stops moving, but the outer quill continues to move down over it at a much reduced rate of speed. The distance traversed is short and in this travel the outer quill brings a Micro quick firing switch into contact with a cam trigger attached to the inner quill, thus initiating the capacitor discharge and effecting the weld. With such a system, the closing of the switch is entirely independent of the operating speed of the upper head, the



**S**CHMATIC diagram of electrical circuit of the Hi-Wave stored energy welding machine. In operation, switch  $S_1$  is closed, energizing the rectifier transformer  $T_1$ , thereby charging the capacitor  $C$ . When the voltage on  $C$  has risen to the desired value, switch  $S_1$  is opened. To make the weld, switch  $S_2$  is closed, discharging the energy in the capacitor through the primary of the welding transformer  $T_2$ .

**A**DJUSTABLE stroke cylinder with retractable head and air lock for maintaining sliding friction throughout the pressure stroke even after the electrode tips have seated. Stroke of piston B is governed by the position of piston C, the downward movement of which is limited by the sleeve on the handwheel housing K, which turns on threaded shaft D. In its full downward or operating position, piston C becomes the equivalent of the upper head of a double acting cylinder with piston B controlled through the four way, five port valve. So as not to move piston C on the upward operating stroke, the return pressure admitted into chamber E is kept about 10 per cent below line pressure through the regulator R<sub>1</sub>. When full retraction is desired, chamber G is exhausted through the three way valve. Normally, it is under full line pressure. This view also shows the air lock or cushion, the outer quill of which is connected to plunger A.



welding pressure stroke or any other mechanical adjustment that might be made. Sliding friction exists between the inner and outer quill during the whole period of the weld, accomplished in a fraction of a second, so that the welding pressure is uniform and at the selected value. The air lock or cushion

Table I—Typical Kva. Demand on Conventional 60 Cycle, Single Phase Aluminum Welding Machine

Al. Gage, In.	Machine Throat Depth, In.				
	12	18	24	30	36
0.020	50	60	70	80	90
0.040	75	80	95	110	130
0.060	100	125	140	150	190
0.080	150	160	190	210	250
0.125	200	250	300	330	400

Above figures take into account the fact that lower rated machines are used on shorter throats, are specified in round numbers and are based on a horn separation of 6 in. For greater separation the demand is greater. The demand for this type of welding is independent of the speed of welding. The load is always at a poor power factor.

is under the same line pressure as applied to the pressure actuating piston, but its diameter is somewhat smaller, lowering the total reaction and allowing differential movement to take place slowly.

This arrangement constitutes an improvement over the use of either a pressure switch or squeeze period timer used in the past to properly sequence the start of the welding current. Both these latter systems require readjustment each time a mechanical adjustment is made affecting the speed of the operating head or the welding pressure.

Although this equipment was primarily developed for use in welding high strength aluminum alloys, it is also adaptable to the resistance welding of other materials, particularly various types of bronzes. It may also be used on steel in the lighter gages, resulting in welds with a minimum depression on either side of the stock and maintaining all the advantages of low power demand.

In general the machines recommended by the maker for this type of welding are minor variations of Taylor-Winfield types EN and EP resistance welders, the main variations being the use of the air lock for finer control of pressure and the retractable stroke. The type EN machine is suitable for gages of aluminum alloys up to 0.020 in. and the other two types for any of the commonly used gages above that. When using flat tips, it is essential that the welding machine arms be very rigid, a condition that is satisfied on these particular models.

Table II—Kva. Demand of Hi-Wave Aluminum Welding Machine

Al. Gage, In.	Machine Throat Depth, In.				
	12	18	24	30	36
0.020	5	7	15	20	25
0.040	6	10	18	25	30
0.060	8	12	25	30	35
0.080	10	15	30	35	40
0.125	15	20	35	40	50

# PRODUCTION CONTROL

**M**ANY of the problems confronting small businesses at the present time are the result of inadequate planning of production. Much additional office work is caused by tracers and the checking of orders a customer is anxious about.

With an entire plant under an adequate production control system the following advantages can be expected:

I. Greatly improved service to customers by:

- (a) Delivering goods when promised.
- (b) Getting out all orders more promptly by better coordination of work.

II. Supplying necessary information for important management decisions, enabling the company to:

- (a) Tell when additional employees are needed.
- (b) Tell when additional equipment is needed, including type and capacity.
- (c) Accept or reject orders, having before the sales department the time exactly when the order could be delivered. Hence the necessity of working overtime to complete the order and thus permit predetermination of whether a profit could be made at the prices involved.

III. Reduction in costs by:

- (a) Elimination of overtime unless paid for by the customer.
- (b) Elimination of clerical work because:
  - 1—Less tracers would be received from customers:
    - a—All customers would be advised when an order would be shipped at time of acknowledging order.
    - b—Orders would be shipped when promised.
  - 2—Less work in answering tracers.
  - 3—Elimination of many reports required at present to keep in touch with status of work in the plant, such as amount of unfilled orders, number of orders received, etc.
- (c) Reduction of telephone toll charges.
- (d) Elimination of part shipments and taking jobs off equipment before the run is completed.

**IMPROVED SERVICE TO CUSTOMERS:** Sales resistance would be cut down tremendously if goods went out on the date promised. There is no reason why this cannot be done with adequate production control.

Orders would be gotten out more promptly, and a greater volume of work could be run through the plant with present equipment and the present force of men. Very often a setup on a machine is taken down before the job is completed in order to get out another rush job. A large part of

**E**VEN a small plant may often find the handling of production of many items an exceedingly complicated task. Only with adequate production planning can complete consumer satisfaction be approached and maximum profits secured. The author herein, in the first part of a two-part article, describes the need and advantages of production control and introduces the Gantt chart for such control, adaptable to practically any type of plant.

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this could be eliminated with proper planning.

Many times orders are worked on that are not scheduled for shipment until some weeks in the future, whereas other production is urgently needed for long delayed shipments. Instances of this kind, of course, would be entirely eliminated with production control.

**SUPPLYING MANAGEMENT INFORMATION:** In the past the management had to use its best judgment regarding when to put on additional men. Whether or not the plant has more work ahead at one time as compared to another has been largely a matter of impressions, and there has been no clear conception of how long the work on hand would last. With adequate production control actual facts as to whether additional men are needed are available.

Machinery has been purchased without any very clear conception as to whether it was needed any more urgently than some other piece of equipment. Production control will tell exactly when new machinery is needed and what size or capacity is best suited to the requirements.

Also, a glance will tell what equipment is underloaded or used insufficiently. In some cases the sales department could concentrate its effort on the products produced by such equipment and thus know what products they could sell in greater quantities

without causing additional plant investment.

Perhaps more important than anything else, the sales department would have before it at the time of quoting on an order or accepting it just what it would mean in the way of overtime to get the work out at the time the customer wanted it. Thus it could be determined immediately whether it was advisable to accept the order or not. Perhaps the overtime would not permit a profit at the prices quoted, or maybe the customer would be required to pay a higher price to cover overtime if a particular delivery date is specified. Even though it may be found desirable to absorb the additional cost to maintain customer good will, the sales department would have the full picture before it. By planning in advance, necessary overtime could be anticipated and overtime work planned for a short period each day rather than putting in long hours of overtime near the shipping date.

Most companies are very careful not to accept contracts covering more than three months in advance, yet in many cases regular orders are accepted that cannot possibly be shipped for a longer period than three months. For example, in September after the war broke out some companies accepted orders that could not possibly be filled until perhaps January or February. It is easily possible they did not have coverage even on the raw material required at the time of accepting these orders. An unusual advance in raw materials prices would have caused considerable loss of money. By proper production control a company can protect itself by raw material coverage at the prices in effect when the orders are accepted.

**REDUCTION IN COSTS:** A production control system should eliminate a large amount of present clerical work. In the first place less tracers should be received from the customers particularly if a shipping date is shown on each acceptance of an order. It is well known that a number of customers trace orders as a matter of routine; these tracers, of course, would not be eliminated. On the other hand, practically all tracers would be eliminated which check shipments because they are not made on the date promised.



# —HOW TO KEEP DELIVERY PROMISES

But when tracers do come in, they can be handled much more expeditiously with an adequate production control system. Where no well-defined system is in effect, much time is spent tracing orders. The office must call the shop and one of the men is required to go around to the various machines, locate the order and determine when it might be completed. This is in contrast to a system where the office would have available an index of all order numbers entered on the shop showing the promised shipping date. Thus the answer could be given immediately over the phone if the customer called.

In many cases reports now necessary could be eliminated. There are daily unfilled order reports, daily reports of orders received by the shop, daily reports of the oldest order shipped, and the like, all of which information should be available in concise form with an adequate production control system.

Part shipments are always a sizable expense. Not only is the extra package costly, but the labor to ship and keep track of the order is expensive, and a bill-of-lading, invoice, and debit

By **EUGENE CALDWELL**  
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to customer's account must be made out. Most of the part shipments could be eliminated by proper production control. An order calling for several items would be scheduled so that all items would be completed at approximately the same time.

## Gantt Charts

Perhaps the simplest way to keep track of complicated production schedules is by means of Gantt charts. A Gantt chart is a concise method of keeping track of many items in a complex situation and have them all easily visualized on the same sheet of paper.

Gantt charts were developed by Henry L. Gantt, a management engineer, and were used widely by the government during the World War. They were used to schedule all ships under control of the Shipping Board.

The problem was to transport all necessary imports for prosecuting the

war, such as nitrate from Chile, as well as all exports from this country necessary to produce the required imports. For example, coal had to be exported to operate the nitrate mines and to transport it to the coast. The objective was to use as few ships as possible so the maximum number could be turned over to the War Department for the transportation of soldiers and supplies to France. Each commodity was charted against the requirements. It was found, for example, there was sufficient asbestos to meet requirements until 1941; consequently an embargo was placed on this item, and the ships involved allocated to other commodities.

There is nothing involved about a Gantt chart. It can be used to picture almost any situation where the actual is compared with the planned. Straight lines only are used, and no lines cross each other. Therefore no color other than black need be used; in fact, the charts are frequently drawn with pencil.

Standard Gantt charts are 11x17 in.; this size folded once equals 8½x11 in. The charts most commonly used have vertical columns for each day

STATUS OF WORK SCHEDULED IN STAMPING DEPARTMENT

	MONDAY, DEC. 18 9 HR.	TUESDAY, DEC. 19 9 HR.	WEDNESDAY, DEC. 20 9 HR.	THURSDAY, DEC. 21 9 HR.	FRIDAY, DEC. 22 8 HR.	SAT. DEC. 23 0 HR.	MONDAY, DEC. 25 0 HR.	TUESDAY, DEC. 26 9 HR.	WEDNESDAY, DEC. 27 9 HR.	THURSDAY, DEC. 28 9 HR.	FRIDAY, DEC. 29 8 HR.	SAT. DEC. 30 0 HR.	
TOTAL STAMPING DEPARTMENT													Loaded to Jan. 4
PRESS No. P-15													
PRESS No. 30													
PRESS No. 37													
PRESS No. 38													
PRESS No. 39													
PRESS No. 53													
PRESS No. 54													
PRESS No. 55													
PRESS No. 56													
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PRESS No. 58													
PRESS No. 59													
PRESS No. 1060													
PRESS No. 1061													
PRESS No. 1062													
PRESS No. 1063													
PRESS No. 1064													

for a two-week period and horizontal lines for each piece of equipment.

### Use of Gantt Charts

The accompanying illustration shows a sample Gantt chart illustrating the items scheduled for a stamping department on Dec. 18, 1939. A separate line on the chart should be assigned to each piece of equipment in the plant. The equipment should be divided up into departments, the entire department being shown on one sheet. The sheets should preferably be divided up so that all the equipment under a particular foreman or department head is on the same sheet. Other considerations, however, may sometimes make some other arrangement more desirable.

For each department a totalizing line should be drawn showing how the total load for the department is up to schedule. Then the same should be shown for a grand total for all equipment in the plant. Another line would show the load on the packing department. Other departments, where all equipment is identical or where all orders require the same procedure, would require additional single lines. Orders out of the plant for work done outside would be shown on one line.

In any department where all equipment is more or less interchangeable for all sizes, a single line will show the load on the department. Otherwise a separate line will have to be allotted to each machine.

Each time an order is entered on the shop the length of time required to run the order on the particular machine must be calculated, and a line should be drawn equal to that length of time. Of course, this line must be drawn at the end of the orders already scheduled for that particular machine. Thus an actual date showing when the order should be completed can be obtained before sending the order to the shop.

### Changes in Schedule

It will immediately come to everyone's mind that a plant cannot have an inflexible production planning system which would not permit placing rush or emergency orders ahead of items already scheduled. Of course, this can still be done. In fact, complete information will be available for doing just that. When a rush order is placed in the schedule ahead of other production, it will immediately be seen what other orders will be delayed. After weighing the importance of these orders with the one at hand, an intelligent decision can be made.

Then, too, there will be delays from the planned schedule, because the time actually taken may not come out with the forecast. Moreover, a breakdown or mechanical trouble may delay all schedules. After these charts have been in operation for some time and the particular plant has developed some experience with them, a certain amount of time each week to cover contingencies will probably be allowed. This will take care of any ordinary delays; extraordinary delays must be taken care of by changes in the schedule itself.

### Procedure

Master production control charts in the hands of the production manager should be kept. These will be up-to-date at all times and will reflect any changes made. Then, perhaps once a week, the chart will be made up for some duplication process such as blueprinting or for running off on the Ditto machine by using an indelible pencil. As many copies are run off as necessary to supply everyone interested in the office and shop with information for making promises.

The order department should have this chart to answer intelligently requests for shipment at an earlier date than promised. The quotation department should base shipping promises upon the chart. Perhaps every Monday morning would not be often enough for reproducing the chart, in which case there would be nothing to prevent reproducing it daily.

In addition, an index of order numbers showing shipping dates should be made up. This will simply be a numerical list of order numbers, and as an order is entered on the shop, the proposed shipping date would be entered opposite. Those numbers remaining blank would mean the order of that number had not yet been entered. One copy of this index in the office would perhaps be sufficient, but if more were needed, there is no reason why it could not be reproduced in the same manner as the charts. Obviously this would save checking all over the plant to determine shipping dates when a tracer was received. The information would be instantly available.

The master charts kept by the production manager would show the picture as clearly as it could be seen at the time the chart was made up. Although some changes will be made by rubbing out, the original charts should be saved and filed for future reference in case it is desired to determine what the load was on particular equipment at any time.

When the charts are made for two weeks' planning ahead, it is possible that some of the capacity of the equipment will be engaged for longer than two weeks, in which case the line will have to run out to the end of the chart, and then a notation of the date shown when all orders in the shop for that piece of equipment could be completed. In case the majority of the equipment is engaged more than two weeks ahead, it is usually advisable to chart a two-week planning period beginning at a time when most of the equipment is free.

### Special Considerations

**UNFINISHED ORDER:** On any date when a chart is made out there will generally be an order on the press which is partially completed. In this case a light line should be drawn from the date the item was supposed to be completed back to the beginning of the chart. Then a heavy line should be drawn underneath, showing the progress being made on that particular schedule. If the production is ahead of schedule, then the line will be ahead of the date of the chart; if behind schedule, a cross line will have to be shown at the end of the lines to indicate the time that will have to be allowed to make up for the delay.

**ORDER SCHEDULED FOR A SPECIFIC DATE:** Many orders are specified for delivery at some future date. These orders should be placed on the chart beginning with the date the order must be shipped and working backwards. A line drawn on the chart whose length is equal to the required time necessary to run the order will thus give the latest date that it is possible to start on the production and complete it in the required time. In this way the equipment can be left available for other orders where the customer is in more of a hurry for the merchandise. Of course, if there is no other production for the machine (as will be indicated by a gap between the present date and the beginning of the line for the future scheduled order) then production should be started on the future delivery order. This will mean that production will be ahead of requirements for the particular order; but the equipment will be free then for running emergency orders that might develop during the period the press would otherwise be tied up. Consequently the maximum of service will be given all customers.

**Ed. Note:**—Next week the author will conclude with other factors that may be handled with the Gantt chart, and also will give detailed explanation of chart usage.

# Grinding of HARDENED GEARS

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*IN this continuation of Mr. Dixon's article from THE IRON AGE of Feb. 22, page 29, various methods of mounting gears for tooth grinding are described and data are given on grinding wheels and coolants. The first article covered the advantages of the process and pictured different designs of gear grinders.*

IT is a well established fact that no machine is any better than the tools used on it. It is therefore essential that the accessories necessary in gear grinding be considered.

Different designs of machines have different provisions for mounting the work to be ground. Some mount the work in a vertical plane between centers and others in a horizontal plane between centers. Still others have a collet arrangement with, and without, a steady-rest to support the opposite end. Irrespective of how the work is mounted, the tool engineer must provide adequate means for holding the various designs of gears the teeth of which are to be ground.

## Work Mounting

Gears which are assembled on shafts when in use require an arbor having a bearing surface similar to that of the shaft the gear is to be mounted on. Gears which are cut integral on shafts can either be mounted on centers, if such centers are available, or mounted on the shaft bearings.

When cylindrical plug bearing arbors are used, it is obvious that the

diameter of the arbor should be made so as to fit the gear as snugly as possible without mechanical force, and provision should be made to clamp the gear on the arbor without distorting it. Fig. 11 shows an arbor. It will be noticed that the gear is placed on the arbor locating one face against an arbor shoulder, which must be square with the bearing plug. A nut clamps the gear through a full-floating equalizing washer which contacts the opposed face. To obtain best results, the arbor centers must be as true with the bearing plug as it is possible to make them—and the center should be free from mutilation or dirt, and of ample proportions to carry the load imposed. The driving dog used to connect the arbor assembly to the involute generating mechanism in generating-type machines, or to the index head on form-wheel type machines, must be locked without distorting the assembly.

On machines which use a collet for the driving means, the dog is omitted and the end of the arbor is held in the collet.

Where production is high, and the gear face and hub is of such dimen-

sions as to permit it, more than one gear can be mounted on an arbor. The permissible number depends on the design of the gear and the grinding length capacity of the machine. While this multiple mounting saves index time and overrun, it requires more care in lining up gear teeth before grinding.

Fig. 12 shows a spline arbor which locates on the involute splines. On this type of arbor the splines should be true with the centers. The same type of clamping and dogging is generally used as on plug-type arbors.

The type of arbor or adapter used when the gears must be located on an external bearing is pictured in Fig. 13. Here it is required that the internal bore of the adapter be true with the centers.

Fig. 14 shows the work mounted on a split bushing, which in turn is mounted on a taper arbor. The only justification for this type of mounting is extremely low production requirements such as might be encountered in a job shop, or elsewhere where one or two gears of a kind are being ground. When using a split bushing arrangement, the operator should carefully indicate the gear so that it will run true on centers.

Fig. 15 shows a gear which is cut integral with a centered shaft. On such applications the driving dog is applied directly to the shaft, and the centers in the shaft must be in good



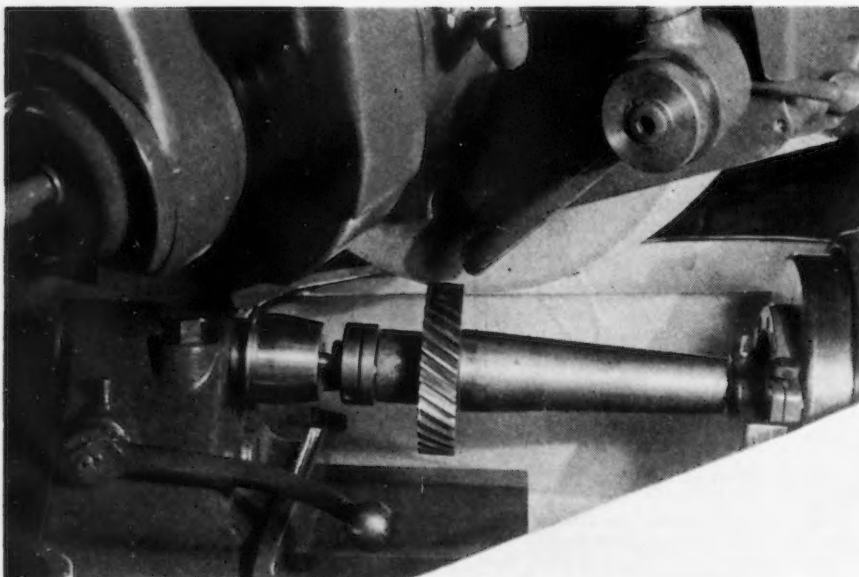


FIG. 11—In this gear tooth grinding set-up the gear is placed on the arbor so that one face locates against a shoulder, which must be square with the bearing plug. A nut clamps the gear through a full-floating equalizing washer which contacts the opposed face.

physical condition, free from mutilation.

Too much cannot be said about the care of centers in both the machines and the work. Care must be given to see that they are kept in first class condition. More work is spoiled, while being ground, because of bad centers than for any other single reason. This is true of all types of center ground work.

#### Work-Locating Fixture

Fig. 16 shows a type of work-locating fixture which assures the driving dog being mounted in proper relation to the tooth space. After the first gear in the lot has been ground, and before it has been removed from the arbor, the arbor assembly is mounted between centers in the fixtures, the tapered locating pins are placed in the tooth space centralizing it, and the dog locator is adjusted so as to contact the same face on the dog as the positive side of the work driver in the machine. In this way each arbor has the driving dog in the correct position on the arbor to bring the tooth space in the gear into proper relation with the grinding wheel on the machine. As a rule arbors are furnished in duplicate to permit the operator to load one while the other is in the machine.

#### Wheels for Gear Grinding

A grinding wheel (or wheels) is used to produce the tooth profile. In the form-grinding type machines the

wheel is dressed to the desired profile and in the generating-type machines it is either dressed or adjusted to the

desired pressure angle. Practically all machines use a solid-type wheel manufactured by the vitrified process. This particular type of bond makes an extremely strong wheel, but because of its requirement of high firing heat and its more exacting drying process, it takes longer to manufacture than other bonds. Most wheel makers carry a stock of wheels on hand, however, and delay is not often experienced in obtaining them. In a few isolated cases, slotted-type wheels and segmental-type wheels have been used. The segmented wheels have been of silicate bond, because of manufacturing reasons.

The first requisite of a grinding wheel is its ability to remove stock rapidly, without setting up strains which might result in untrue surfaces. This requires a free cutting wheel, which will not glaze the work or generate sufficient heat to change the physical properties of the gear material.

If the wheel is of too hard a grade to break away of its own accord, then it must be dressed frequently—this wears it away rapidly and puts a hardship on the diamonds.

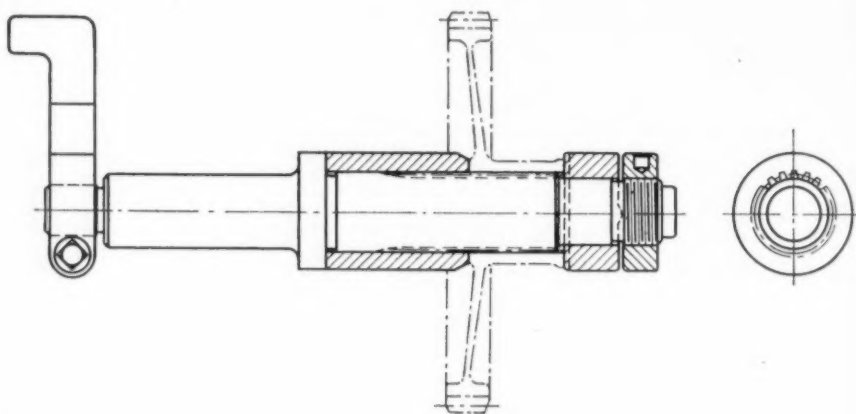


FIG. 12—Arbor which locates on the involute splines. The splines must be true with the centers.

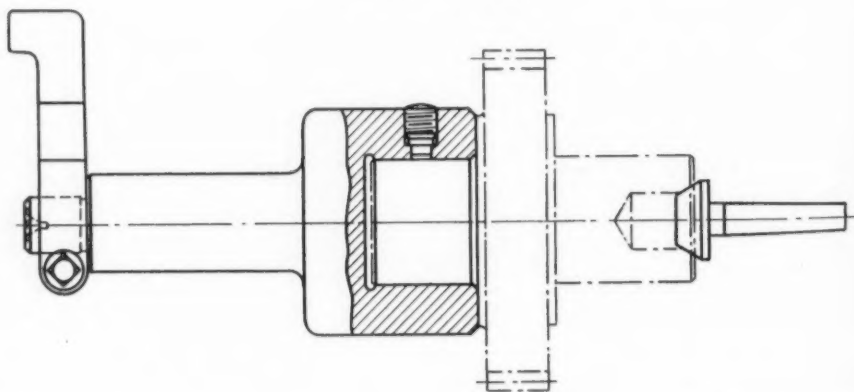
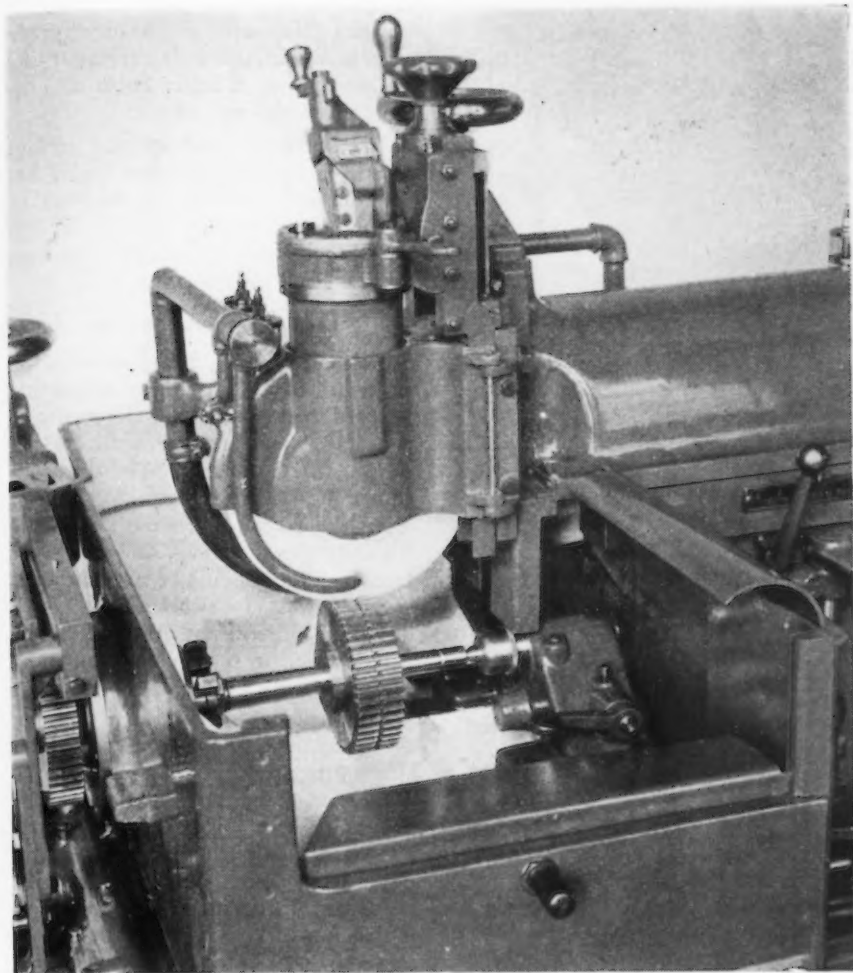


FIG. 13—Type of arbor or adapter used when gears must be located on an external bearing.



ABOVE

FIG. 14—Work mounted on a split bushing which in turn is mounted on a taper arbor—an arrangement used in extremely low production.

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Secondly, the finish produced by the wheel must meet inspection requirements. As a rule a 50-grain wheel will produce a satisfactory surface.

#### Wheel for Root Grinding

When it is necessary to grind at the root of the tooth, the grinding wheel works under greater hardship than when root grinding is not necessary. It has been found that a finer grain wheel is more efficient for root grinding than a coarse grain wheel. For this reason aircraft manufacturers use wheels as fine as 80 grain.

Wheels ranging from 6 to 30 in. in diameter are used in the various makes of gear grinding machines. Other factors being equal, the larger the wheel diameter the longer it can be maintained constant. On the other hand, the losses sustained in unusable wheel

portions are greater on the larger diameter wheels.

This question of wheel sizes has been carefully studied by machine designers and, all things considered, the wheel size selected by them for their machine is no doubt the ideal size.

Certain machines are provided with more than one spindle speed in order to maintain a more uniform wheel speed as the wheel wears.

Selection of wheels requires considerable thought, and where the services of a ceramic engineer are available, his recommendations should be followed. The machine vendor as a rule furnishes one or more wheels with the machine, and his experience in gear tooth grinding enables him to select wheels which should meet all but exceptional requirements.

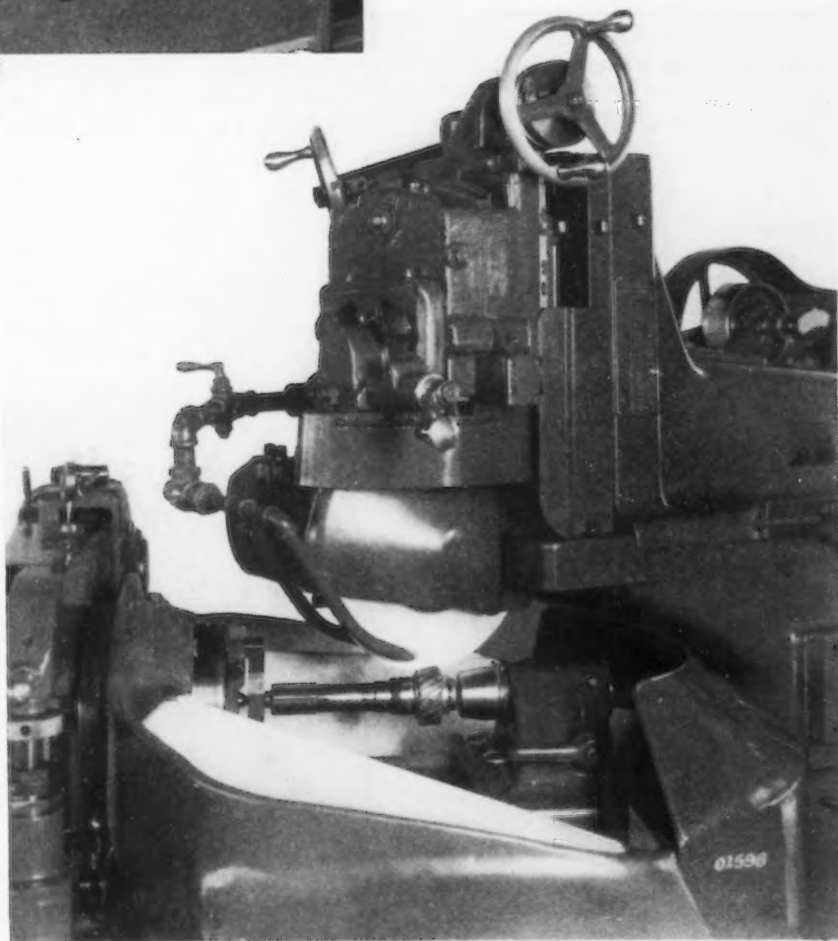
#### Gear-Grinding Coolants

A supply of grinding wheel coolant is provided for and used on most ma-

• • •

BELOW

FIG. 15—On gears cut integral with a centered shaft the driving dog is applied directly to the shaft.



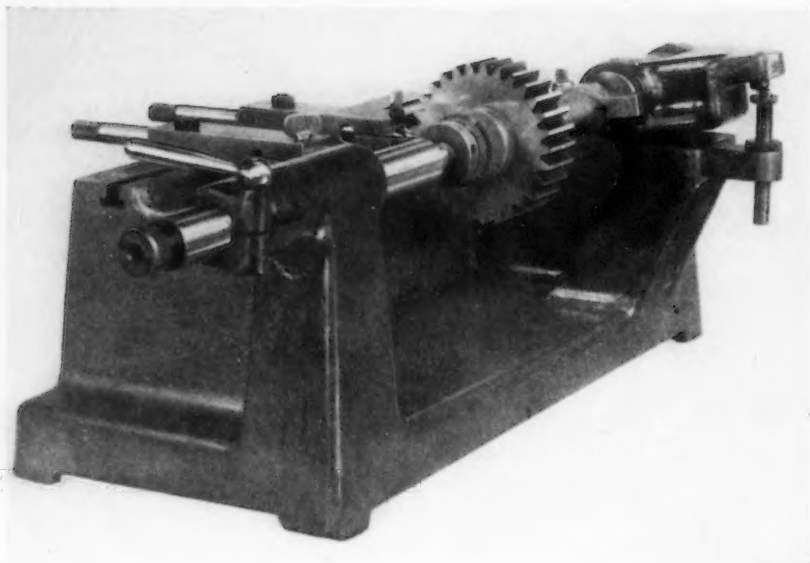


FIG. 16—Work-locating fixture designed to assure mounting of the driving dog in proper relation to the tooth space.

chines, and a number of different types of coolant have been used. Soluble oil which is for the most part water, is an exceptionally effective coolant, but on certain types of gear material it permits wheel loading, which in turn results in glazing, heat checks and skin softness, unless the wheel bond is of soft enough grade to break away and present new cutting surfaces.

Recently several different so-called

gear grinding oils have been placed on the market, and have been generally used with good results. They show marked ability to keep the wheel clean and free from loading, which eliminates glazing of the work on frequent dressing. Oil is not so easily dissipated from the work as a water solution, and the result is a minimized, if not complete elimination of skin softness or heat checks. Because of its ability to keep the wheel clean, oil

permits the use of harder grade wheels, which means longer wheel life. In many cases a better finish also results from the use of oil.

Use of oil as a gear grinder coolant is still in an experimental stage, but the marked increase in the use of ground gears should justify the research necessary to produce an even more efficient oil coolant.

#### Use of Truing Devices

Diamond wheel truing devices are furnished on the machines, but should be used with discretion. Necessity of constant wheel dressing indicates improper wheel selection. The diamonds should be of proper size to properly dress the wheel, and have substantial life. As the diamonds dull and wear from use, they should be turned to present a new surface to the wheel, as a dull diamond will not properly dress a wheel which in turn may result in an incorrect tooth profile.

In conclusion it should be said that the machine tool builder is always striving to produce more accurate and efficient machines and equipment. The grinding wheel maker is constantly improving the efficiency of his grinding wheels, and the coolant producers are active in their development of better coolants. The result is that more accurate gears can now be ground faster and cheaper than at any other time, and even greater progress can be expected as time goes on.

## ENAMEL FOR PLASTICS DEVELOPED

THE political strategy, "If you can't lick 'em, join 'em," apparently has been adopted by industry, as shown by the announcement by one of the large paint companies of a new enamel for coloring plastic parts. Recently developed by chemists of the Sherwin-Williams Co., Cleveland, the new finish makes it possible to coat cheap black plastic material with beautiful iridescent colors—a technique already being used by Crosley Radio Corp. for radio cabinets and by Gen-

eral Electric Co. for electric iron handles.

For many applications of plastics there is no need of additional finishing operations. However, it has been necessary in some instances to use costlier resins and expensive pigments in order to achieve the more brilliant colors required in many modern appliances. Working on the theory that color need be used only on the surface and not throughout the entire molded piece, Sherwin-Williams' chemists worked for years on the problem of

getting proper adhesion for such coating materials. The smooth greasy surface of plastic moldings heretofore prevented successful coating.

The new enamel, called Kem Bakolescent in the iridescent form and Kem Plastite in solid colors, can be dipped or sprayed on plastic parts and combines any color of the rainbow with a long wearing surface. Other moldings which are now being finished with these new coatings are vacuum cleaners, electrical wiring devices, and automobile parts.



# WHAT'S NEW IN POLISHING, CLEANING AND FINISHING APPARATUS

By FRANK J. OLIVER  
Associate Editor, *The Iron Age*

**I**NCLUDED also in this periodical review are briefs of accessory apparatus for the plating of metals and several new processes for coating of metals to resist oxidization, particularly at high temperatures.

are bronze to reduce wear on the threads. A tray is included for composition and tools, together with a wrench hook. These lathes are furnished for 220, 440 and 550 volts, two or three phase, 60 cycle; also for other a.c. or d.c. circuits.

lb. and power consumption is said to be about 1c. per hr.

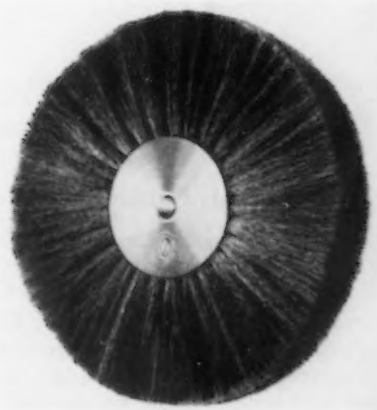
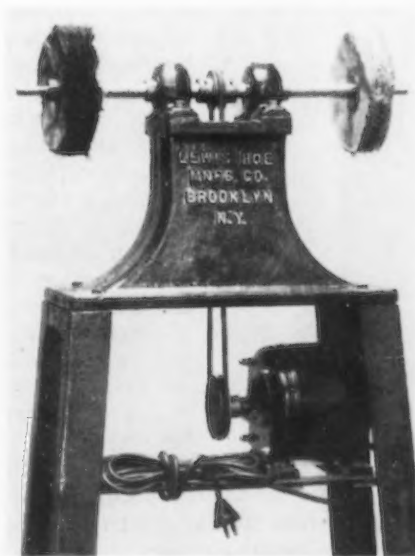
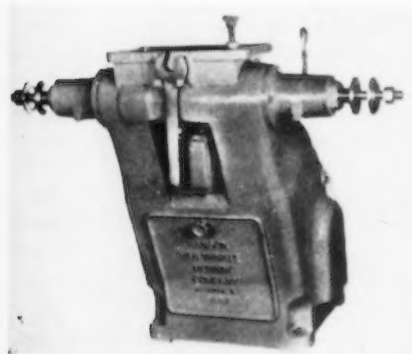
## Scratch Brushes

**A** METAL hub of light weight alloy in place of wood is being offered by the *Hanson-VanWinkle-Munning Co.* in a new line of scratch brushes. The use of metal in place of wood permits the drilling of the tuft holes close to the edge of the block, thus eliminating most of the projecting shoulder. These holes are drilled and countersunk in a special machine so as to give the tufts a firm seat in the metal block and yet leave no sharp edges to cut the tuft. Permanently tight tufts are said to be assured by the use of drawing wire of high tensile strength wedged individually into the sides of the holes by a special method. These Metal-Hub brushes are made in all diameters with any number of rows and in a variety of hub and arbor hole sizes. Steel,

## Buffing Lathe

**T**WO new models of overhanging spindle type buffing and polishing lathes have been put on the market by the *Hanson-Van Winkle-Munning Co.*, Matawan, N. J. The type M1 illustrated is for heavy duty, while the type MO is for lighter work. Both types have V-belt drives with adjustable tension, and spindle speeds from 1800 to 3600 r.p.m. may be obtained. Motors are ball bearing equipped and are protected by magnetic starters. In the type M1 machine motors may be had from 3 to 10 hp., the base dimension remaining the same at 26 x 24 in. Spindle is mounted on precision ball bearings, and spindle nuts

**F**OR much lighter buffing and coloring work, the *Lewis Roe Mfg. Co.*, 1050 DeKalb Avenue, Brooklyn, has developed the machine shown. It has a  $\frac{3}{4}$  in. spindle, 20 in. long, mounted on self-aligning ball bearings and is driven by a  $\frac{1}{4}$ -hp. motor by V-belt. The ends of the spindle are tapped for attaching taper points. This whole unit with stand weighs only 100



brass and nickel silver wire of all sizes may be used, as well as Tampico bristle and hair.

#### Tilting-Tumbling Barrels

**E**XTRA heavy castings of semi-nickel steel and iron for greater durability and economical performance under severe working conditions are incorporated into the design of a new line of tilting tumbling barrels, announced by the *Globe Machine & Stamping Co.*, 1230 West 76th Street,



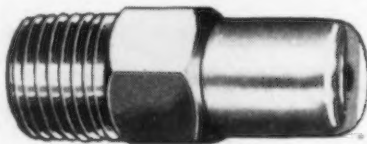
Cleveland. A patented work shifting bottom is securely welded inside the shell, forcing the load to shift alternately forward and backward as well as tumbling it around in the revolving barrel, thereby speeding up the polishing operation and imparting greater uniformity to the finish.

Globe barrels are available equipped with wood shells for cleaning and finishing parts where the volume is not great enough to warrant more expensive equipment. Such barrels are charged with sufficient sawdust to adsorb the moisture, and after the barrel has revolved for a short time, it is tilted to a lowered position, thereby permitting the sawdust to drain through a sieve cap while the barrel is still rotating.

#### Spray Nozzles

**F**LAT spray nozzles for metal cleaning and processing and for industrial washing machines, are being offered by the *Spraying Systems Co.*, 4021 Lake Street, Chicago, for use wherever spray patterns are overlapping and where a flat spray with a

heavy center is desired. As the illustration shows, the spray is the flat type with slightly heavy center. It can be had in a number of different spray angles. Nozzles have  $\frac{1}{4}$ -in. male pipe

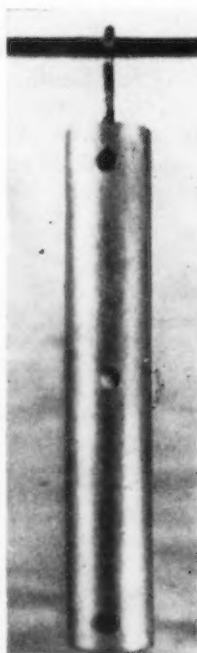


connections. Capacities range from 1.5 to 3.5 gal. per min. at 10 lb. pressure and 3 to 7 gal. at 40 lb. pressure. Standard construction is brass or all iron.

The same firm is also offering nozzles to produce a hollow cone spray with uniform distribution. These new Whirljet nozzles are available in brass, all iron, hardened steel, stainless steel, monel metal, lead, hard rubber and other corrosion resistant materials. Capacities range from 0.5 to 2.5 gal. per min. at 10 lb. pressure. Pipe connection is  $\frac{3}{8}$  in. male.

#### Tubular Lead Anode

**A**TUBULAR design of lead plating anode, stated to give unusually even throwing power and low resistance for the current-discharge

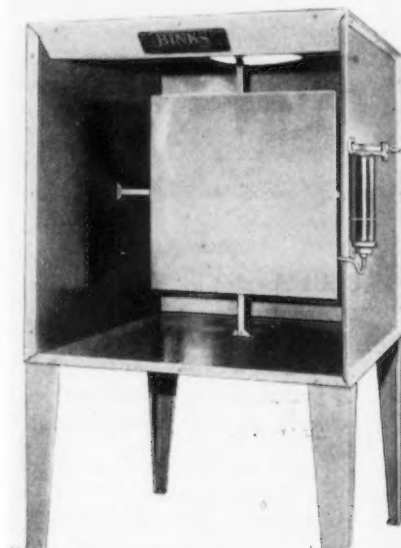


surface available. is being manufactured by *Acme Lead - Burning Co.*, 3726 West 73rd Street, Cleveland. It may be supplied either with pure lead or with 6 per cent antimony. This type of anode is particularly recommended by the maker for the center anode busbars of a tank because of the equal current distribution on all sides. For the anodes of the side busbars, a semi-circular pattern is suitable or the ordinary flat anodes may be employed. It

is claimed that because of the simple design and the smaller amount of lead needed, these tubular anodes cost less than the regular flat ones.

#### Low Cost Spray Booths

**A** NEW Roche low cost standard size RB-1 spray booth has been introduced by the *Binks Mfg. Co.*, 3114 Carroll Avenue, Chicago, for use of the small manufacturer. Of cubical shape, the booth measures 42 in. on a side and is constructed of 22 gage sheet metal with companion flange construction. All panels are interchangeable so that the exhaust fan can be run out of top, side or back of booth. A line of inexpensive 15 in. diameter exhaust fans has been designed to be



used with the new booths. Fan blades are non-sparking and are mounted on oilite bearings. The motor, which drives by V-belt, is mounted outside the exhaust duct on an adjustable base. Legs 31 in. high can be furnished for the spray booth.

#### Plating Rectifier

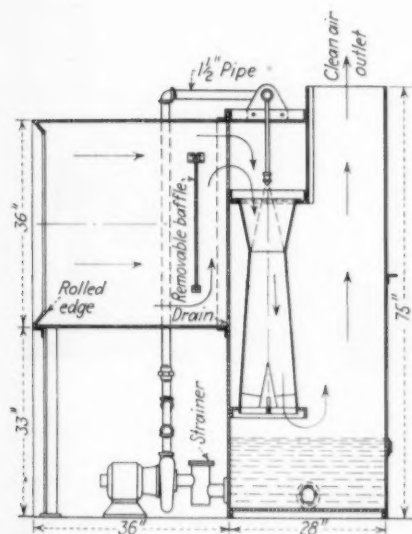
**A** SMALL plating rectifier incorporating the new selenium stack has been placed on the market by the *W. Green Electric Co., Inc.*, 192 Broadway, New York. The initial unit which is for small plating plants and



laboratories will deliver  $7\frac{1}{2}$  volts and 4 amp. on continuous load and well over 8 amp. on intermittent load or flash plating. It operates on a.c. only, at line voltages of 105, 110 and 125 volts. To put this Selectro-Plater into operation it is only necessary to plug into an a.c. supply, and connect the cathode and anode leads to the binding posts. Voltage is adjusted from zero to maximum through a single control knob and the potential is read on a panel voltmeter. Except for the control knob, there are no moving parts to the unit, and it may be mounted in any position. The dimensions of the model shown are 10 x 6 x 5 in., and the weight, 10 lb.

### Water Wash Spray Booth

SHOWN in the line drawing is the new Hydro-Clone spray booth in which the air flow through the spray hood is induced by water jets or nozzles that spray downward into venturi tubes located in the washing chamber. The water and fumes together with the surplus sprayed material impinge

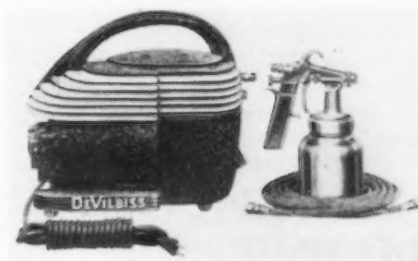


on the vaned cones at the bottom of the venturi tubes and this action is said to be so thorough that the fumes and solids are completely suppressed in the water. After it is strained and filtered, the water is recirculated through the spray nozzles by a pump. Each tube will handle 600 cu. ft. of air per min. with only 50 lb. pressure on the spray nozzles. This volume produces the required 100 to 200 ft. per min. air velocity at the face of the hood. These spray booths are supplied in any size by the Faraday Engineering Co., 56 Clearway Street, Back Bay, Boston. Separate

dewatering tanks are available for reclamation of the solids.

### Spray Painting Outfits

ATTRACTIVELY housed in streamline design is a new series of small paint spraying outfits announced by the DeVilbiss Co., Toledo. Compressor is a ball bearing piston type direct connected to a standard



$\frac{1}{4}$ -hp. motor. These together with the air strainer, crankcase, and pulsation chamber form an integral unit. Rated displacement is 4.3 cu. ft. of air per min. at 40 lb. pressure, and actual air delivered at this pressure is 2.6 cu. ft. These NCB units are supplied in five assemblies, three of them cup gun outfits and two, pressure feed paint tanks of 2 gal. capacity.

### Filter Paper

A NEW high strength filter paper for filter presses, such as are used in reclaiming plating solutions, has been introduced by the Enthone Co., 442 Elm Street, New Haven, Conn. The paper possesses exceptionally long fibers and in addition has been given a patented wet strength treatment. The paper is placed against the filtering canvas or screen, and the filter cake deposits upon it, thus simplifying the cleaning of the canvas. The paper, being only a few mills thick, allows tight locking of the plates and frames. Tests by the supplier have shown that this paper possesses high strength in acid solutions with a pH value as low as 2.0 and in strong caustic solutions up to 15 oz. per gal. of caustic soda.

The Enthone Co. has also announced an addition for pickling baths, the effect of which is to produce a marked lowering in surface tension of sulphuric or hydrochloric acid pickling solutions, thus resulting in the saving of acid by drag-out. It is claimed that the acid pickle containing this so-called Pickleen also functions as a cleaner, giving smoother and more rapid

pickling action on iron or steel which has not been thoroughly cleaned of all grease or oil. This cleaning action is reported to help insure proper adhesion of plated coatings after acid dipping, by removing oil films themselves or the fatty acids liberated from them in the pickle if complete rinsing of the cleaner was not done.

### Propeller Type Agitators

THE Binks Mfg. Co. has also announced the production of a line of propeller type air motor driven agitators for both open and closed containers. The No. 939 series for open containers consists of two airplane type propellers, pitched in opposite directions so they throw the material toward the middle, insuring better mixing and preventing splash. The shafts can be furnished from 12 to 27 in. long. The No. 636 series, consisting of an agitator drive, is for closed barrels already equipped with hand agitating facilities. It is furnished with three adapters for the usual adapter openings. In this design, not illustrated, the air motor and gear assembly are detachably mounted on a sturdy bracket, adjustable to drum diameters from 12 to 26 in., covering the 5 to 55 gal. range.



### Paint Spray Outfit

ANOTHER small paint spray outfit driven by a  $\frac{1}{4}$ -hp. motor is the new Roche DS painting outfit with diaphragm type compressor, offered by the Binks Mfg. Co., 3114 Carroll Avenue, Chicago. Compressor delivers 2.2 cu. ft. of air per min. at 26 lb. pressure to a specially designed Roche J gun. This gun handles all kinds of





average viscosity paints, enamels, lacquers, varnishes, etc. A similar outfit with piston type compressor is also offered for similar light duty application.

#### Hand Clamp for Mixers

A NEW hand clamp for its portable Lightnin mixers is offered by the *Mixing Equipment Co.*, Rochester, N. Y. Adjustable features permit a variety of mixing actions including the



Lightnin off-center double mixing action. Chief feature of the hand clamp is the patented double bronze wedges with aluminum handwheel which tightens the wedges through a parkerized locking screw. Kingpin and locknut are cadmium plated, all materials and finishes being selected to prevent the parts from rusting or "freezing together." This hand clamp is now standard on all portable Lightnin mixers of  $\frac{1}{8}$  hp. and larger.

#### Drying Lamps

FOUR new infra red drying lamps designed for industrial drying and heating jobs, including the drying of enamels, lacquers and paint, have been announced by the *Westinghouse Lamp Division*, Bloomfield, N. J. The new line includes a 250-watt lamp with pear-shaped clear glass bulb and me-



dium screw base; a 250-watt reflector drying lamp in the familiar inside-frosted R-40 bulb, also with medium screw base; and 500 and 1000-watt lamps in clear glass, globular bulbs, both with medium bipost bases, for heavy duty work. All are designed for use on 105 to 120 volt circuits. With the exception of the reflector drying lamp, all should be used in conjunction with especially designed aluminum or gold plated reflectors. The reflector drying lamp is a self-contained lamp and reflector, incorporating a metallic reflecting coating applied to the inside of the specially shaped blown glass bulb. Rated laboratory life of all the new drying lamps is in excess of 5000 hours.

#### Metcolizing Process

METCOLIZING is the name given a new process of coating iron and steel, and in some cases copper and bronze, with aluminum in order to prevent oxidation and scaling at high temperatures. Not to be confused with the process of aluminizing, the Metcolizing process entails the application of Metco aluminum by the metalizing process, to be followed by the application of a liquid preparation known as Metcoseal and then subjecting the assembly to a simple heat treatment. As a result, next to iron or steel a high iron solid solution of iron and aluminum is formed, next to this a layer of  $Fe_2Al_3$  aluminum eutectic, third a high aluminum solid solution of iron and aluminum, fourth solid aluminum and finally aluminum oxide. When the article is placed in service, the aluminum continues to oxidize on the outside and to diffuse further into the steel. At temperatures over 1470 deg. F., the oxidation is rapid and the aluminum layer soon disappears, leaving the residual solid solution layer which provides the protection to the coated article at high temperatures. The process was developed by the *Metallizing Engineering Co., Inc.*, 21-07 41st Avenue, Long Island City, N. Y., and is being offered to industry without license fees.

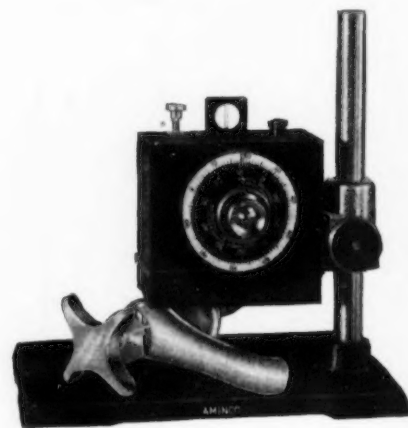
#### Aluminum Treatment

A SIMPLE, inexpensive and rapid method of producing a satisfactory paint base coating on aluminum and its alloys has been developed by the metal finishing laboratories of the *Pyrene Mfg. Co.*, 560 Belmont Avenue, Newark, N. J. Called the Pylumin process, it involves only the simple im-

mersion of the aluminum parts for a few minutes in a heated solution in a steel tank. The hot solution prepared from Pylumin powder converts the aluminum surface into a non-metallic film of complex basic oxides, hereby forming a coating highly resistant to corrosion and forming an anchorage for paint, lacquer or enamel finishes. The metal is given a gray to black color and a velvety texture. An important characteristic of a Pyluminized surface is said to be its effectiveness in preventing the spread of corrosion around any portion of the final finish that might become accidentally injured.

#### Coating Thickness Tester

THE Aminco-Brenner Magne-Gage, an instrument for measuring local thickness of coatings on metals by the rapid, non-destructive magnetic method, has been greatly improved since its introduction in 1937 by the *American Instrument Co.*, 8010 Georgia Avenue, Silver Spring, Md. The



moving part of the instrument consists of a small permanent magnet suspended from a horizontal lever arm. The attractive force between the magnet and the specimen is indicated on a graduated dial which governs the tension in a spiral restraining spring. The dial readings are translated in thicknesses by means of calibration curves. The improvement, greatly increasing the utility of the instrument, now makes it possible to measure various types and thicknesses of coatings simply by interchanging different types of magnets. The present instrument will measure nickel coatings on non-magnetic base materials; non-magnetic, metallic or organic coatings on magnetic base materials; and nickel coatings on iron or steel. The method is simple and rapid, besides being non-

destructive. The instrument is fully described in bulletin IA 2070.

### Anti-Scaling Compound

**F**ERRITROL is the name applied to an anti-scaling compound for plain carbon steel parts subjected to oxidizing atmospheres or to high temperatures. A product of E. F. Houghton & Co., Philadelphia, it consists of a pigment made up of metallic oxides especially chosen for their refractoriness suspended in a vehicle, which also has refractory properties. When steel coated with this compound is exposed to high temperatures, there is an intergranular penetration of the steel by the coating in much the same way that carbon acts in the carburizing process. The imperviousness of the coating as well as its strong adherence resists cracking or scaling. The coating is said to have high physical strength and to resist shock and spalling. Ferritrol is supplied in liquid form in gallon, quart and pint cans.

### Protective Compound for Stainless

**A** NEW metal protecting compound to be used in conjunction with ordinary wrapping paper for the protection of stainless steel sheets and materials during storage, fabrication and shipping has just been announced by Paisley Products, Inc., 1770 Canalport Avenue, Chicago. This compound

is brushed on the metal and the paper is spread over the coating, or the paper may be coated and smoothed onto the metal. It is claimed the paper will lie perfectly smooth, affording an excellent surface for layout work besides protecting the metal against abrasion during handling. The paper and compound is removed by washing off with warm water.

### Wax Coating for Aluminum

**T**O protect the production finish of anodically treated aluminum during handling, shipping and erection, the Skybryte Co., Cleveland, has introduced a new wax, known as production wax No. 2. This liquid material is applied with brush or cloth and it leaves a firm, transparent surface that serves as a protection against discoloration. Besides being suitable for aluminum surfaces, it is recommended by the manufacturer for use on bronze, chrome and other bright surfaces.

### High Melting Wax

**A**CRAWAX C is a new high melting synthetic wax recently introduced by the Glyco Products Co., Inc., 148 Lafayette Street, New York. It has a melting point of 133-134 deg. C. and yet is not hard or brittle like most high melting waxes. It is insoluble in water and soluble hot in mineral spirits, turpentine, toluol, naphtha and sim-

ilar hydrocarbon solvents. In such solutions, it forms a stable gel on cooling. Acrawax C blends with paraffin, carnauba wax, candelilla wax and rosin.

### Porcelain Ground Coat

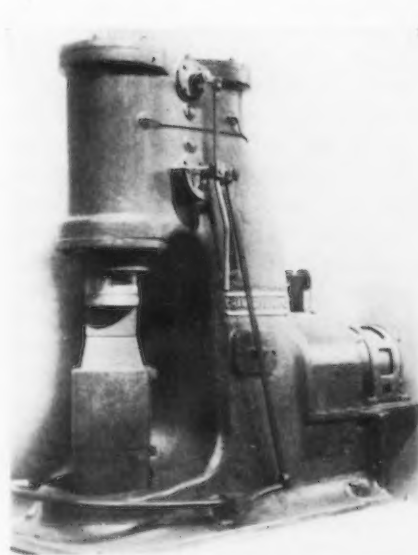
**R**EMARKABLE wide firing range and a smooth satiny finish without excessive gloss are claimed for a new blue porcelain enamel ground coat announced by the O. Hommel Co., 209 Fourth Avenue, Pittsburgh. It is said to be ideal for thin cover coat application and one that will not burn off at the edges. Covering even the most difficult of shapes, it is claimed to eliminate blistering caused by defective steel and has never fishscaled even under the most stringent of tests.

### One-Bake Enamel

**H**AMMERED and spatter effects are easily obtainable with two spray operations but with only one bake (at 300 deg. F. for 20 min.,) using Vitra-Carlite Hammerkraft and Vitra-Carlite Spatter, made by the Hilo Varnish Co., 42 Stewart Avenue, Brooklyn. Both finishes are claimed to have excellent adhesion, heat resistance and toughness, and are especially designed for use on circulatory heaters, coal and oil furnaces, hot water heaters and stove shells where beauty and durability of finish are desired.

## Novel Pneumatic Forging Hammer

**D**UE to heavier anvil construction and higher impact speeds, more actual forging per blow is claimed for the new motor driven pneumatic forging hammer recently put on the market by the Chambersburg Engineering Co., Chambersburg, Pa. Construction is unique in that compressed air for the ram cylinder is provided by a compression piston in a separate cylinder driven by crank through a two stage speed reducer from the motor. As the compressed air immediately is displaced from the compressor cylinder to the ram cylinder, air of increased temperature is used in operating the ram, said to give increased efficiency and greater expansion of the air. The gear train and pitman are



mounted on roller bearings to eliminate need of adjustment and all moving parts are inclosed,

This type of hammer is made in nine sizes with falling weights of 200 to 3000 lb. The anvil weight is never less than 15 times the falling weight. Corresponding ram strokes are 14 to 40 in. A one-piece design, with the anvil integral with the frame is available in the 200 and 300 lb. sizes, and a solid frame with separate anvils in sizes up to 500 lb. Larger sizes are made with a two-piece frame, the lower part being a base plate which encircles the separate anvil. The treadle shown in the illustration provides flexible control of blow with one-man operation. Where two-man operation is necessary, a hand lever control is supplied.

# THIS WEEK

## ON THE

# ASSEMBLY LINE

By W. F. SHERMAN  
Detroit Editor

*... Price cuts hit Detroit like a blitzkrieg ... Auto production registers slight gain attributable to sales upturn ... Engineers debate automatic transmissions; doubt drivers want to lose free will control of shift.*

**D**ETROIT—Like *blitzkrieg* for the Detroit area came the revelation last Friday that prices of automotive flat steel products were cut \$4 a ton. Circumstances of the latest in the series of price upsets were more unusual than in any of the previous price wars. Predominant in the observations that were immediately made was the plain fact that little skirmishing preceded the break and no hesitancy marked the several announcements of suppliers: "We will remain competitive."

Observers arrived at the almost unanimous conclusion that—

(1) The price cuts might be withdrawn abruptly; on the other hand, it is almost certain that coverage will be extended for the rest of this quarter—withdrawal would only serve to help protect prices for next quarter, when 1941 automobile steel tonnage will be placed.

(2) If the weakness in price is allowed to prevail, it will spread, with only Europe's war as a possible reversal factor.

(3) There is no acceptable evidence that real price cutting (previous to Friday) existed, at least not on a very broad scale.

Skirmishing on a very broad front has generally preceded breaks in price in the Detroit area. In this case, however, there were little more than rumors of weakness—and those seemed impossible of confirmation. Thus, U. S. Steel's announcement Friday morning that it was taking recognition of a \$4 cut came as a bombshell to automotive buyers who had little grounds for suspecting that such a sharp downward revision was imminent; as a matter of fact, even the unconfirmed rumors placed the price concessions at only \$2 or \$3, and even buyers have conceded that the weakness up to then was mostly wishful thinking.

On the basis of 1939 steel consumption of 3,703,100 tons of sheet

and strip, a \$4 cut for the entire calendar year is the equivalent of \$14,812,400 price cut, or "gift." Moreover, the present reduction applies to other than automotive products and on this basis last year's 10,000,000-ton output of sheet and strip would have been subjected to a \$40,000,000 price cut.

### Assemblies Gain Slightly

Current automobile production has registered another slight gain attributable to the sales upturn in the last part of March. Last week's output was 102,940 cars and trucks, compared with 101,655 in the previous week and 88,050 in the corresponding week last year, according to Ward's Automotive Reports. An improvement in Ford operations was responsible for the gain. Ford-Mercury output was stepped up from 20,150 to 22,000, while Lincoln-Zephyr production was unchanged at 480. General Motors and Chrysler volumes were only slightly changed, the former declining 161 units to 43,755 and the latter gaining 45 units to 24,680. In these two groups only Plymouth registered an advance from 11,685 to 11,810 while Chevrolet was steady at 25,000.

While export of automobiles for private use in Europe is small because of the war, there are indications that sales of American cars on the Continent might boom under favorable post-war conditions. It appears likely that American engine designs and passenger car construction is drawing closer to the revised European concept of requirements. Justification for this expectation that American-built cars might find less economic resistance in Europe lies in the American trend toward the "light-weight" automobile—by which we mean cars like the Studebaker Champion and the

proposed light-weight Ford Six, the Nash and the Packard which has been talked about. At the same time, there has been a strong tendency in Europe to do away with horsepower taxation and concentrate automotive taxes solely on fuel, thus emphasizing economy. Germany eliminated the tax on rated horsepower some years ago and derives its automotive revenues (or did in peacetime) from fuel taxation, it is understood. Of course, passenger cars still bear license plates, but they are symbols for identification, not a tax stamp. Trucks, it is understood, pay Reich taxes on a weight basis comparable to the conventional U. S. method. Italy removed the horsepower tax on Jan. 1. France was at least on the verge of revising its automotive tax system when the war came along. England appears to be the important hold-out.

The design trend resulting from this change in economic pressure on the owners' purses is in the direction of bigger engines than the present European passenger car types. To get performance out of the very small (5 to 15 hp.) engines which resulted because of the tax on horsepower, European designs were forced to turn at speeds regarded as terrific in this country. Now with no restriction on size or power, European designers will tend to specify larger, and considerably slower engines. The stress will be almost entirely on economy of gasoline consumption. The American trend, which at present is in the direction of 70-75 hp. engines that are quite economical, may eventually coincide with the demand that will arise in the European market. In addition to the economy angle, engineers point to the slower r.p.m. of these engines and the accompanying longer life. That longer life will be an extra incentive to more general use of passenger cars in Europe.

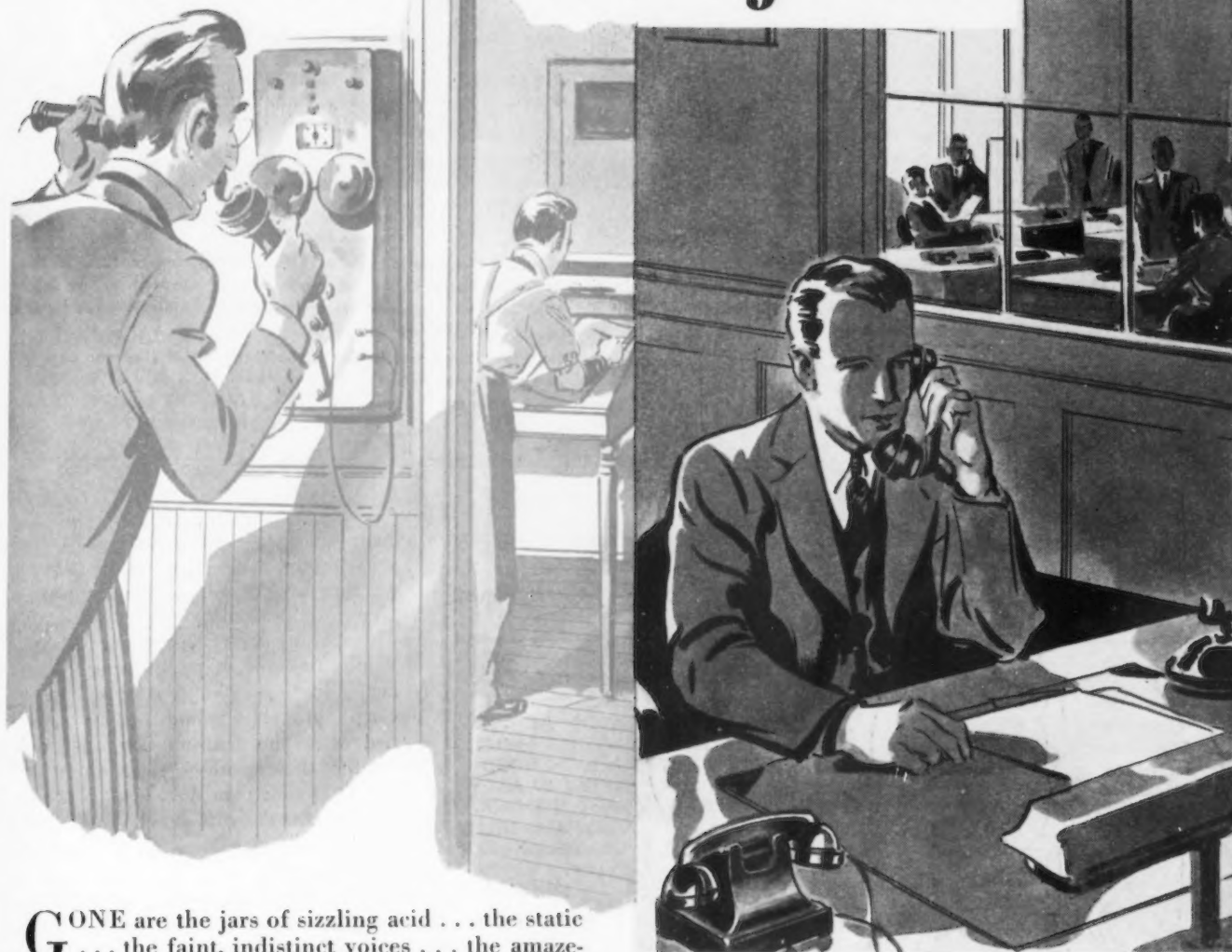
### Automatic Transmission Discussed

A many-sided analysis of desirable characteristics of automatic transmissions was presented at a recent gathering of the Society of Automotive Engineers in the Detroit area. It is evident that there are almost as



# ACCURACY

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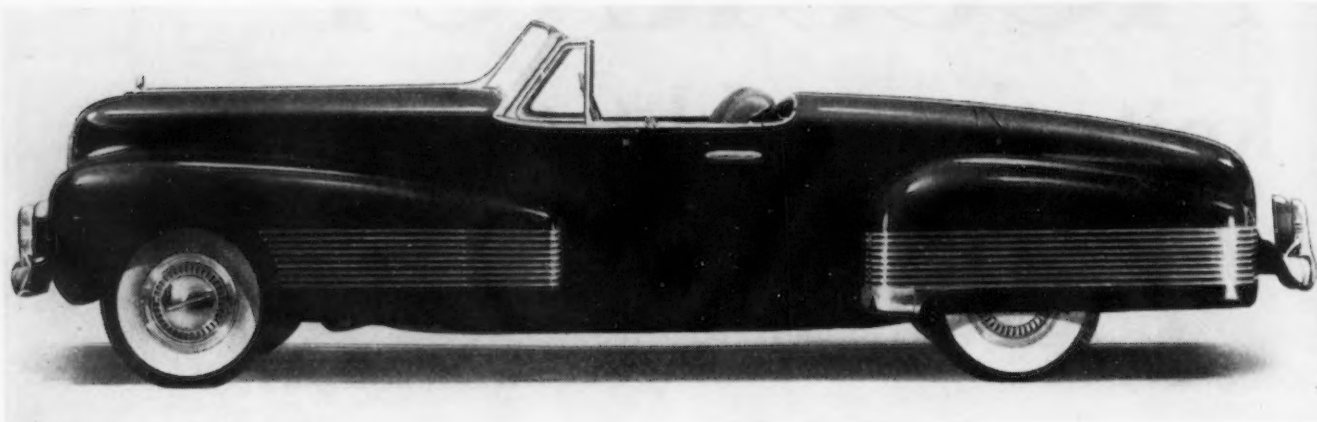
of them third and fourth generations of families that came under the Pratt & Whitney banner when the founders took on their first crew. The innate accuracy of Pratt & Whitney machine tools, cutting tools, and gages is transmitted in full force to the products this equipment manufactures . . . creating an opportunity for alert managers to reduce costs, increase production, swell profits. When you buy, investigate Pratt & Whitney equipment. It pays big dividends.



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## More Streamlining in New Motor Car Design



**T**HIS Buick experimental model was built recently by Harley J. Earl, chief of the styling section of General Motors, in cooperation with Buick engineers. It is one phase of the "style testing" that is necessary in the development of new models and also enables the designers to try out any mechanical innovations incidental to the new line. Disappearing headlights, flush-type door handles, completely concealed automatic top, electrically operated window regulator, smaller wheels with airplane type, air-cooled brakes, a new bumper guard and license

plate bracket combination and other innovations are features of this test car which has a 123 in. wheelbase and is powered by the Buick Series 50 engine. Complete streamlining and close-to-the-road construction are emphasized in the design.

A feature of the front fender is the stamping of the rear part of the fender integral with the door at the hinged side of the door. Running boards are "inbuilt" and concealed by the door.

### THE BULL OF THE WOODS

BY J. R. WILLIAMS



many opinions—and designs—as there are engineers. It is even questioned whether an entirely automatic transmission is desired by the public at all. The average driver, according to S. O. White, director of engineering, Warner Gear division, Borg-Warner Corp., probably would not be satisfied with the transmission that did do the theoretically "right thing at the right time" but does want a transmission to do his clutch work and gear shifting for him.

Engineers who arose to agree with Mr. White's lecture, or to offer other opinions, suggested that probably the driver would require overruling controls that would enable him to "make his own mistakes" or perform special functions demanded by the exigencies of traffic. At the same time, it was argued that "if any automatic device needs overruling control, it is evident that it does not 'do the right thing at the right time'—if it does, why overrule it?"

Some engineers propose the turbine type of torque converter as the eventual solution, but it was pretty generally agreed that the present step-type transmission, with the fluid couplings, is a logical and direct step. The debate, which included many contrary opinions on every phase of the subject, is indicative of widespread change to come in the next few years.

### Tool Engineers Talk On Electronic Control

DETROIT — Demonstrations of new adaptations of electronic discharge devices in the automotive and allied industries were given at the April 11 meeting of the American Society of Tool Engineers in Detroit by Ralph A. Powers, of the Electronic Control Corp. The speaker dealt particularly with some new uses of electronic (trigger) controls for gaging rapidly. At the meeting, Detroit chapter officers were installed for the next year. C. L. Hause, of Gorham Tool Co., was introduced as the new chairman; B. L. Diamond, of Modern Tool Co., vice-chairman; C. T. Mooney, Pioneer Engineering Co., secretary, and William C. Maier, Haberkorn & Wood Co., treasurer.

### Stewart Motor Corp. Starts Production

THE recently reorganized Stewart Motor Corp. started production last week in the company's plant at Buffalo. John A. Lux, general manager, reports that the company will be primarily concerned with patterns, tools and dies for the remainder of the year and does not expect to get into full swing until 1941. Between 60-100 units will be produced during the current period, 400-500 in the year following. The company will concentrate on a tractor-trailer with a six-wheel unit, municipality and dumping operators, and units for general hauling.

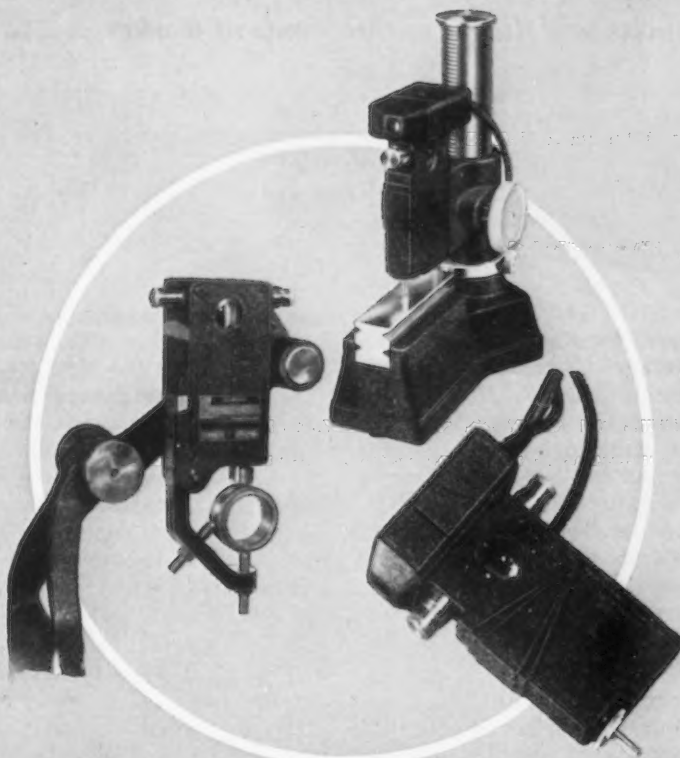
### LeBlond Buys Abandoned Remington-Rand Plant

CINCINNATI—Richard K. LeBlond, president, LeBlond Machine Tool Co., revealed last week that he had purchased the plant which formerly housed the Dalton unit of Remington-Rand Co., at Norwood, Ohio. This plant was abandoned by Remington-Rand following labor troubles four years ago. The factory consists of two buildings with a total of 160,000 square feet of floor space. There also are seven acres of land included. Mr. LeBlond said the acquisition would not be used for his machine tool company, but did not reveal his plans.

### Republic's First Quarter Earnings Are \$3,111,723

Republic Steel Corp. reports first quarter earnings of \$3,111,723, compared with \$6,772,692 in the fourth quarter of 1939.

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# THIS WEEK IN WASHINGTON

*... Hook and Ford show TNEC how technological progress has created jobs, reduced prices, lifted American standard of living to record height . . . Murray, SWOC leader, claims continuous mill displaces thousands of workers.*

By L. W. MOFFETT  
*The Iron Age*

WASHINGTON—Testifying all last Thursday before the Temporary National Economic Committee, Charles R. Hook, president, American Rolling Mill Co., said that technological developments had increased employment and wages, lowered working hours, reduced prices and relieved workers of back-breaking jobs. Evidence of a similar character as it related to the automobile industry was previously given the committee by Edsel Ford, president Ford Motor Co.

Challenging the views of Mr. Hook, Philip Murray, president Steel Workers Organizing Committee, on the stand all of Friday, gave a theatrical presentation as he pictured large-scale unemployment in the industry as the result of hand-mill workers being displaced by the continuous mill. Sharply contrasting with the factual record submitted by Mr. Hook, the SWOC head gave an estimate of lay-offs in hand-mills that exceeded the number they employed even when operating at maximum capacity.

## SWOC Wants Shorter Week

As a means toward expanding industry and employment, Mr. Hook suggested the lifting of Government restrictions. He proposed that the committee (already authorized to do so), make a study of the effects of the tax policy on business. When Mr. Hook urged a Congressional program to stimulate business, Senator Joseph C. O'Mahoney, chairman of the committee, interjected that for some time he has had a similar view.

Mr. Murray presented a five-point "remedy," one of which called for "approximately 30-hr. a week at prevailing earnings or more." It ran directly counter to Mr. Hook's declaration that the steel industry cannot

increase employment by reducing the work week below 40-hr. He told the committee that the present work week is the "minimum for economic production." If hours were further reduced, Mr. Hook said, it would be necessary to increase wages considerably to maintain the present weekly income of employees, and prices would have to be increased to a point where sales would decline, making it impossible to give work to as many workers as are now employed.

The prefabricated steel house was pointed to by Mr. Hook as one of the promising research projects now under way in the steel industry. While he would not make the forecast that large-scale production was in the "immediate offing," he said such dwellings already furnish more dollar-for-dollar value than the present housing types.

In his program, Mr. Murray also proposed that all workers "displaced as the result of technological changes," be given dismissal wages of 10 per cent of earnings for a 10-yr. period, which, it was declared, should total at least \$500.

## Vocational Training Urged

Additionally he suggested: Federal Government large-scale vocational training program for displaced workers, to adapt them for other jobs in industry; measures designed to have industry reabsorb workers displaced by technological changes; and passing on to consumers the economic benefits of technological improvements.

In offering this program, Mr. Murray observed that Congressional measures should be enacted to provide industry with incentives to keep workers on the payroll until they can be reabsorbed in the normal labor turnover:

Mr. Ford told the committee that he did not think legislation is necessary

to adjust labor affected by mechanization. The Ford company was said to be making the adjustment. Widespread unemployment and depression in agriculture were mentioned by Mr. Ford as factors discouraging the production of a \$500 car to sell to the low-income group.

Like Mr. Murray, President R. J. Thomas of the CIO-United Automobile Workers Union, suggested shorter work hours, and increased wages, this to be done by making the motor company share profits with employees.

## Old, New Fenders Compared

Mr. Hook presented a striking factual record, elaborately illustrated by charts, to show technological accomplishments by the steel industry as a whole and the continuous rolling mill in particular. In sharp contrast with SWOC contentions, Mr. Hook cited figures reflecting a rise in employment, in wages, in output per man, and reduction in working hours parallel to the growth of mechanization. Mr. Hook had brought into the large hearing room old and new automobile fenders to illustrate the vast improvement in product and the sharply reduced price resulting from development of the continuous mill which the American Rolling Mill Co., pioneered, beginning in 1924.

An old Model T 1923 Ford fender, roughly finished, crude in appearance, was easily handled by Mr. Hook while a large heavy, unpainted, smooth surfaced 1940 Buick fender, stamped from a single sheet, rested on the floor as an assistant held it in an upright position. The old fender, a handmill product, Mr. Hook said, was made from a sheet selling at \$135 per ton. The Buick fender, he said, was stamped from a continuous mill sheet selling at \$62 per ton. Another old fender, also made from a handmill sheet, was displayed showing the rather rough welding of two stamped sheets, a process made obsolete with the development of the continuous mill.

## Half Billion Investment

Since the first continuous sheet rolling mill was put in operation, said Mr. Hook, 27 such mills had been installed by 1937, representing a total investment by the industry of approximately \$500,000,000. A list of the mills, taken from THE IRON AGE of Jan. 6, 1938, was submitted. Building the equipment, Mr. Hook said, has provided

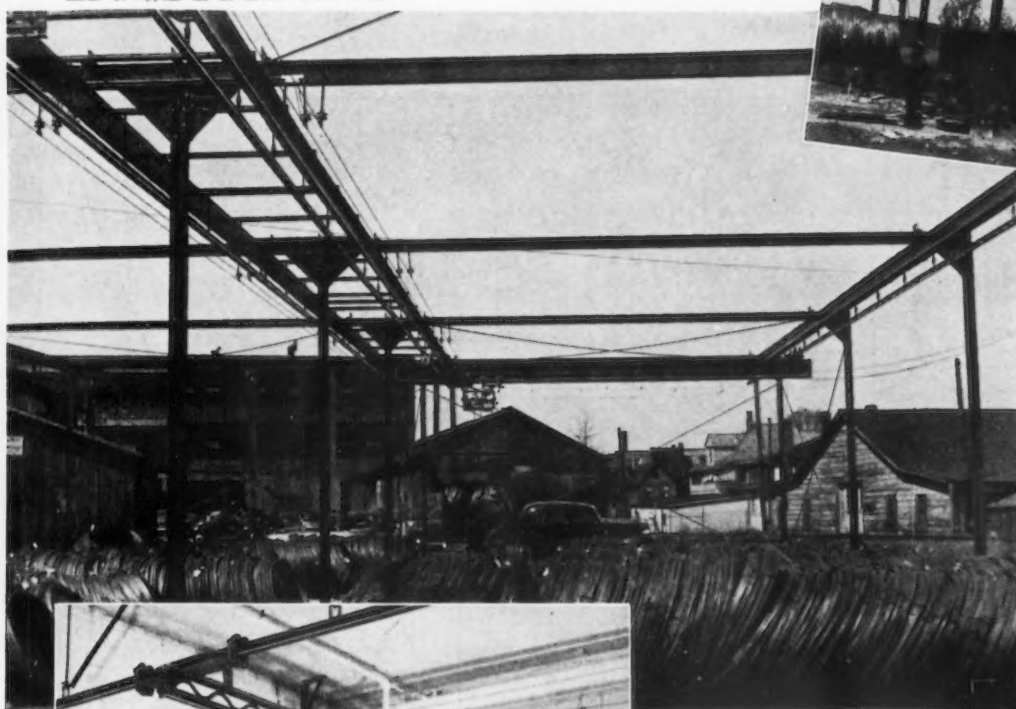
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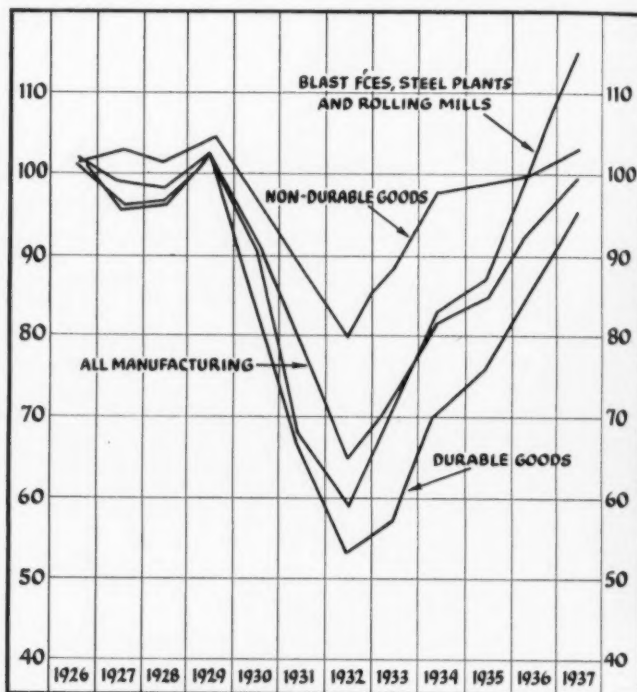
work for thousands of workers in the construction and equipment industries. Questioned by A. F. Hinrichs, chief economist, Bureau of Labor Statistics, Mr. Hook said that the continuous mill not only had increased employment but had eliminated the back-breaking job in the handmill and permitted the transfer of older employees to the new operation. Quoting figures from the Bureau of the Census, Mr. Hook said that total employment in the steel industry increased from 427,000 in 1927 to 544,000 in 1937, or 27.4 per cent, while in

all but one of the continuous sheet rolling mills were introduced into the steel industry.

"It has been alleged that 85,000 to 90,000 workers have been displaced by the continuous sheet mill process," said Mr. Hook. "Such a claim is shown by an examination of the facts to be wholly without foundation.

"In 1926 a total of 1264 handmills for producing hot rolled sheets and black plate were in existence. The greatest number of men that could have been employed on these mills, on

**T**HIS graph, shown the TNEC by Charles R. Hook, president, American Rolling Mill Co., is based on U. S. Department of Labor indexes of employment in manufacturing industries (monthly average 1925-1927=100).



the meantime the population increase has been 11.2 per cent.

Technological innovations relating to blast furnaces and open hearth processes, mechanical and electrical equipment, labor-saving devices, improvements in supervision, better working conditions, incentive systems, etc., are all factors which may permanently influence changes in output per man-hour, Mr. Hook said. To attribute a given increase in output per worker to any one of these many factors, he declared, would seem to be highly theoretical and, from a practical point of view, impossible to demonstrate with any acceptable degree of accuracy.

#### **Workers Not Displaced**

Mr. Hook then turned to a record covering changes in a large unit of Armco in which the continuous mill represents the outstanding technological improvement. For that purpose he chose the period covering 1926-1937 because it was during that period that

three-shift operations, would have been approximately 43,000 or only about 10 per cent of the total number of workers employed in the entire iron and steel industry at that time."

Yet in the face of this factual demonstration, Mr. Murray subsequently told the committee the strip mills are displacing 83,970 workers, 37,020 of whom have already been disconnected from the steel industry. The former figure is about twice as many and the latter figure is only 6000 under the total number of men that could have been employed in all the hot rolled sheet handmills in 1926 even if they were operated at top capacity, as shown by Mr. Hook. Mr. Hook also estimated that there are only 15,000 handmill workers in the industry today. Yet Mr. Murray, in his dolorous recitals, said that the "death list is not yet complete—that 14 plants or departments are scheduled to be abandoned permanently. In these plants are 23,450 workers who are soon to be thrown





## *The Shock of Peace*

THE dislocations of industry that usually follow the declaration of peace are now being considered by far-sighted executives. They are convinced that the use of more advanced equipment will permit them to produce consumption goods at new low costs. They are determined that millions will use and enjoy goods which hitherto have been out of their reach—resulting in more rather than in less employment. The Monarch Machine Tool Company, Sidney, O.

*Monarch*  
*Lathes*

into the streets." Mr. Murray said that there are 18 small independent companies with obsolete handmills "whose future is definitely limited."

"Of course it is true that when a continuous sheet mill replaces handmills more jobs are affected than those of the immediate handmill crew of some eight or ten men," said Mr. Hook. "Other jobs on operations back in the plant leading up to the handmill or connected with its maintenance are affected also. But that does not mean that such jobs are eliminated. In most cases they are merely changed."

"Men who were skin passers, shear-men, bundlers, oilers, weighers, picklers, and cranemen on the handmills are doing the same kind of work on the continuous mills. I have cited only a few examples. There are many more."

"Not only are such jobs held over in the continuous mill operation, but in some categories the number of men required is greatly increased."

"Moreover, the continuous mill creates new jobs which do not exist in the handmill. I will name only a few of these, such as bearing setters and helpers, welders, recoil operators and stitcher operators."

#### More Workers Required

"Another factor bearing upon the record of increased employment in the steel industry is the significant increase in the production of light flat rolled products from 6,327,000 tons in 1926 to 10,793,000 tons in 1937. That required more workers in the blast furnace, the open hearth, and in all finishing, processing and shipping departments. It must also be realized that many new technical, administrative and selling jobs have been created by this increased volume of production."

"I am sure that there is unanimous agreement among consumers of sheet steel that the improvement in quality and properties of this product, resulting from the continuous mill, has made possible extensive improvements in many widely used consumer articles. Notable among such improvements are those in the automobile, washing machine, electric and gas range, kitchen cabinet and refrigerator industries, all of which have resulted in providing for the consumer a constantly improved product at a steadily reduced price."

"Steel users not only have benefited from improved quality, which makes for possible lower fabrication costs, but they have also enjoyed the ad-

vantage of lower prices as well. From 1926 to 1939 the average prices of all iron and steel sheets realized by our company declined 31.1 per cent.

"Advantages from the continuous sheet mill process have come to labor in two important ways."

"First, workers have benefited from the lightening of their task and from the improvement of working condi-



CHARLES R. HOOK (above), president, American Rolling Mill Co., tells the TNEC that labor-saving devices in industry actually increase employment during normal economic periods.

tions in the rolling mills. As a former worker in the mills myself, I speak from personal experience when I say that the work on the old style hand mill was one of the most arduous and difficult of any in the steel industry. The continuous mills, wherever they have been installed, have completely eliminated all of the difficult and taxing manual phases of work in the rolling mill."

"Second, workers have benefited from the broadening of markets brought about by the continuous sheet mills. Changes in the quality and properties of sheets made by the new process are so great as to amount practically to the introduction of an entirely new product in the steel in-

dustry. It is a product which lends itself to uses and applications utterly beyond the scope of old style sheets."

"Accordingly, workers are employed in the production of large tonnages of sheet steel for uses wholly non-existent before the appearance of the continuous mill. I could mention, for example, the steel auto top, and one piece auto fenders, each of which is stamped at a single operation from a single wide steel sheet."

#### Workers' Earnings Advance

"Moreover, since 1926, average earnings of workers in the steel industry have increased from 63.6c. an hour to 84.7c. an hour, a gain of 32 per cent. Meanwhile, there has also been a substantial shortening of hours of work."

"The hot rolled production of other than light flat rolled products in the years 1926 to 1937, shows a reduction of 11 per cent or approximately 3,000,000 tons, while at the same time the light flat rolled products increased approximately 4,500,000 tons, requiring about 45,000 men. This number of men is more than was previously employed on all of the sheet mills in 1926. It is evident, therefore, that the introduction of the continuous rolling mill has not been accompanied by a decrease in employment, but on the contrary, since its adoption, the number of workers in the steel industry has materially increased."

Reflecting the rapid displacement of the handmill, a chart was exhibited by Mr. Hook showing that in 1926 sheets rolled on ARMCO's continuous mills represented only 35.9 per cent of the company's sheet shipments, while in 1937 continuous mill sheet shipments amounted to 71.8 per cent of the total. The average number of workers in all the company's plants rose from 6876 in 1926 to 13,253 in 1937, a gain of 92.7 per cent."

Turning to ARMCO's Middletown, Ohio, plant, devoted exclusively to sheet production, Mr. Hook presented a table showing the rise in employment, wages, lower labor cost and reduced man hours per ton in 1937 compared with 1926.

#### Labor Rate Climbs

The average number of workers rose from 3278 to 4327, man hours per net ton declined from 32.5 to 19.1, labor cost per net ton dropped from \$23.15 to \$17.92, the common labor hourly rate rose from 37c. to 62.5c., the average earnings per hour increased from 69.8c. to 93.6c. while the average hours per week declined from

# Things happened to the man who built a better mouse-trap



... and things have happened to  
the company that makes the Cyclone

SOMETHING HAPPENS to the man who makes a better product, as the story of the man and mouse-trap points out... Ralph Waldo Emerson had a similar thought when he said: *"I trust a good deal to common fame, as we all must. If a man has good corn, or wood, or boards, or pigs to sell, or can make better chairs or knives, crucibles or church organs than anybody else, you will find a broad hard-beaten road to his house though it be in the woods."*

As it was true in February, 1855, when Emerson wrote, "I trust a good deal to common fame, as we all must"... it is true today. The successes of any of us are measured in terms of other people's opinions of what we do or make, and the buyer most often receives true value and satisfaction when he follows a broad hard-beaten road to his purchases—a road that has been made broad and hard-beaten by the thousands who went over it before him.

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46.3 to 36.2. The annual average earnings of ARMCO workers, Mr. Hook said, rose from \$1,605 in 1929 to \$1,893 in 1939.

Figures for the entire industry showed that the average number of wage earners rose from 399,914 in 1925 to 502,417 in 1937, man hours per gross ton declined from 23.12 to 19.38, labor cost per gross ton rose from \$14.63 to \$15.85 while hourly earnings increased from 63.3c. to 81.8c. and the average hours per week dropped from 50 to 38.2.

The striking effect of the efficient mass producing continuous mill on prices was disclosed in a table showing that ARMCO's average price of sheets dropped from \$100.15 in 1923 to \$57.31 per ton in 1939. The sharp increase in the production of sheets and tinplate and their widespread consuming sources was shown in an IRON AGE table covering the years 1927 and 1937. Production in the earlier year was 5,018,600 tons and rose to 9,833,400 tons in the later year, an increase of 95.9 per cent.

Mr. Hook said that the committee's greatest contribution to the unemployment problem could be effected with "a proper study" of governmental policies and other factors militating against business expansion.

#### Tax Effects Studied

Specifically, Mr. Hook referred to a clause in the joint resolution establishing the anti-monopoly committee in the summer of 1938 which provides that the agency determine among other things "the effect of existing tax, patent and other government policies upon competition, price levels, unemployment, profits and consumption. . ."

The witness called it "encouraging" that such a study was provided for in the resolution, pointing out that he did not know to what extent the committee had already gone into the subject.

"You'd be surprised," replied Senator O'Mahoney, who earlier had prompted Mr. Hook's remarks by seeking to elicit suggestions on the unemployment problem.

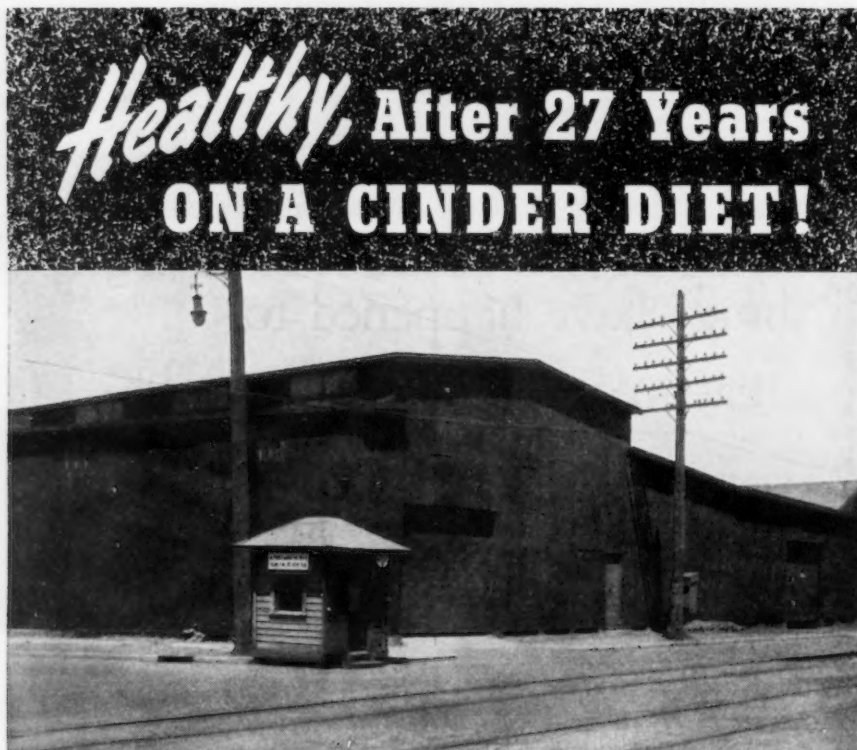
The witness conceded that expanding conditions in "our industry" are not indicative of conditions in all, and attributed the large pool of unemployed today to the lack of investment in capital goods, restrictive tax policies, and lack of confidence. He referred to a report made to President Roosevelt in May, 1934, by the durable goods industries, emphasizing that the suggestions made at that time for stimulating the flow of corporate and private financing continue to be pertinent today. Mr. Hook expressed the belief that Congress should undertake a program aimed at giving definite stimulus to business.

#### Finds O'Mahoney Objective

Expressing his "personal views," the Senator replied that he had for some time been thinking along those lines. Although he did not mention it by name, he referred indirectly to his recent bill to "balance men and machines," explaining that he was interested in a procedure whereby employers could be given a credit for greater employment.

"The difficulty," the Senator told Mr. Hook, "is to suggest a formula which does not conjure up a lot of fears. Not everyone comes before this committee with the same objective viewpoint as you."

Senator O'Mahoney agreed that the big problem today is to get employees on relief rolls back into private employment but questioned Mr. Hook's statement that lack of confidence



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existed by pointing to one of the charts. The Senator noted that increases recorded by manufacturing industries on the chart did not indicate a lack of business confidence.

"I think they do because business should have gone way above these levels," Mr. Hook responded, insisting that normal population growth would have been sufficient to bring about a greater increase in employment if full confidence had existed. Mr. Hinrichs noted that while Mr. Hook's testimony indicated that the overall employment had increased since the advent of the continuous mill, information had not been supplied showing how the individual workers were affected.

#### Displaced Workers Paid

Mr. Hook related how the hot mill employees in Middletown were called together in January, 1929, and advised of developments. Relating that at that time the company thought that eventually all the hand mill workers would be displaced, he explained to the committee the details of his company's separation allowance policy. Out of a total of 1191 men affected in the Middletown mill, about 393 received separation allowances under which the company paid out \$208,000, at the rate of \$530 per man, Mr. Hook recalled. About 592 men in both the Ashland and Middletown plants received a total of \$284,892 under the plan, or an average of \$481 a man.

A substantial number of these workers are now back on the payroll, Mr. Hook continued. He estimated that about 110 workers are now on the company's "idle time payroll" each receiving a monthly allowance.

He told the committee that he did not know the extent to which other companies follow such a plan but he pointed out that an employment relations committee of the National Association of Manufacturers has inaugurated a program to urge manufacturers to plan ahead and to train workers for other jobs where technological advances are likely to have a disturbing effect. Mr. Hook referred also to the association's work on the problem of older workers in industry, suggesting that members of the committee would be interested.

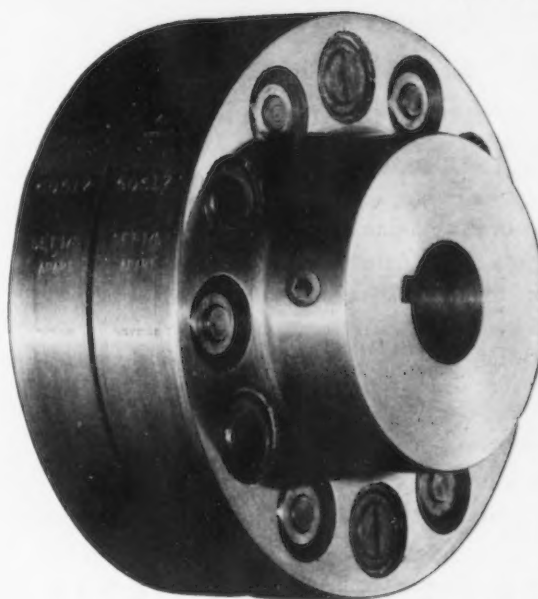
#### Steel Worker Testifies

Violently in conflict with Mr. Hook's testimony, Mr. Murray rolled off some top-flight figures as he etched a canvas of desolation of enormous unemployment in the steel industry,

the result of technological changes. In order that his testimony could be "humanized" he put on the stand Michael Russell, aged 48, who said he had been a roller in a Carnegie-Illinois Steel Corp. handmill at New Castle, Pa., for 20 years, never making less than \$2,000 a year. He was laid off, he said, when the handmill was closed down in 1937. Since then, except for a few months when he worked as a catcher's helper, Mr. Russell said he

has had to support his wife and one child on his WPA monthly wage of \$48. The majority of 1600 workers, who, he said, had been laid off when the plant closed down are on WPA jobs.

Mr. Murray estimated that 30,000 workers in the steel industry have been displaced by technological advances in the past 10 years, and said that 40,000 more workers are "scheduled" to lose their jobs to the ma-



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chine within a few years. Mr. Murray said that workers displaced in all industries in the past 10 years range from 1,500,000 to 2,500,000.

In New Castle, he said, 4500 hand-mill workers have been permanently displaced and that a few years earlier 1200 Bessemer steel workers were displaced, "a total of 5700 victims of technology during the 1930's in a single town." Sixty-four per cent of New Castle's population was said to be receiving some form of Federal as-

sistance, or has been trying to get such aid.

#### Government Control Urged

Apparently aimed as a threat against steel companies that SWOC has not organized, Mr. Murray said that there is no reason why a plan to "eliminate the heavy social cost of technology" cannot be adopted by management where collective bargaining is practiced, but that in the absence of universal collective bargain-

ing Congressional regulation of the introduction of large technological changes is necessary. To this end, he suggested that such improvements be installed "at such times and under such conditions as not to displace workers, bankrupt communities, close up complete mills and otherwise disrupt the social fabric of industrial districts." He then detailed his five-point program. He also repeated CIO's often suggested government-business-labor-farm conference to put more people to work.

Despite his bitter criticism for so-called wholesale abandoning of hand-mills, Mr. Murray said SWOC does not oppose technological advances, but rather "approves them, and conducts a continuous educational campaign amongst its members in favor of technological improvements."

Venting his hostility toward the executives, Mr. Murray said that the SWOC attitude, "unlike that of run-of-mine employers, does not stop there," and that in approving technological changes SWOC "aims to secure the participation of labor in the economic benefits of such changes" and to eliminate their "devastating social consequences."

Speaking of the 18 small companies with obsolete handmills, "whose future is definitely limited," Mr. Murray said 13 of them are under SWOC contract.

He offered to submit both lists—the 14 plants scheduled to be abandoned and the 18 small companies which will be forced to quit business—in confidence to the TNEC. To make them public would add to their credit, financial and other difficulties, he said.

Presenting figures, Mr. Murray said that automatic strip mills can produce tin plate \$17.77 per gross ton cheaper than the hand-mills; and sheets and strip from \$6 to \$8 a ton cheaper.

"In other words," he said, "if the hand-mill workers donated their labor to the small hand-mill companies, they still could not successfully compete with the automatic strip mills."

The new continuous butt-weld pipe mill he cited as another example of technological displacement. In eight such mills now operating 800 pipe mill workers have been displaced, he said.

#### O'Mahoney's Conclusions

Without modern machines and technological improvements it would be utterly impossible for Ford Motor Co. to supply so many cars to so many people. It would be impossible to use the machines without a large pur-

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chasing power and the measure of purchasing power is the ability of the masses to purchase products.

These conclusions were drawn by Senator O'Mahoney from two-hour testimony given before the committee on April 10 by Edsel Ford who said the conclusions were correct. In a prepared statement, read by R. H. McCarroll, chemical and metallurgical engineer for the company, Mr. Ford said that employment by the Ford company during the past six years has not been affected adversely by any possible technological reaction, but that on the contrary the company, even with improved working facilities, has steadily employed more men, paid out more in wages and purchased more materials. Also accompanying Mr. Ford on the witness stand was H. L. Moekle, auditor for the company.

#### New Laws Not Necessary

While Mr. Ford agreed with Senator O'Mahoney regarding the economic and social benefits of technological developments he said he could not offer any suggestions when the Senator inquired how Congress could help his company create more jobs. Instead, Mr. Ford had previously said that he did not believe that new legislation is necessary in adjusting the labor force affected by technological change. He declared that he believed the company had been very successful in its plans for spreading work, annual income payments, wage and hour adjustments, in service training, intra-plant shifting, etc., in making the adjustment and that it will continue to improve its handling of them.

Mr. Ford, in replying to the Senator's question, said that a feeling of uncertainty is arresting developments which would increase employment.

"I don't know what more we can do," he said. "It seems to me the situation will have to wear itself out."

"Isn't there anything that we can do?" asked the Senator, pressing his suggestion for legislation.

"I hadn't thought about it," Mr. Ford responded.

Considerable discussion was given to the possibility of Ford producing a lower priced car so that it could be made available to a low-income group which cannot now afford to purchase a car. Coupled with the query suggestions were asked concerning the prospect of increasing the purchasing power of this group.

#### Could Make a \$500 Car

Mr. Ford said the company could manufacture a car selling for \$500

or less, if "we could have a market of 1,000,000 cars" but that this would have "a very drastic effect upon the used car market." He stated that such a car would have more power and operate much better than the old model "T," which his father pioneered.

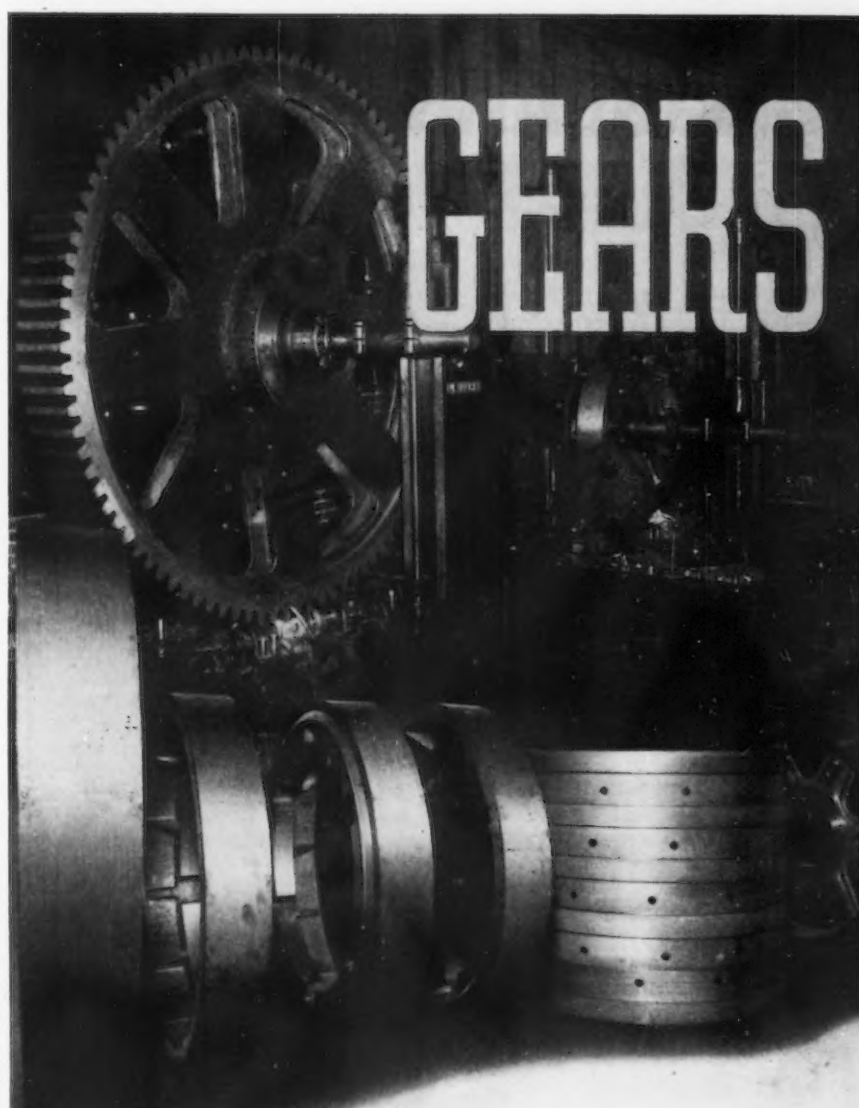
Observing that Senator O'Mahoney had suggested that the ability to make a low priced car would depend on mass production, Representative Reece, Republican of Tennessee, asked what the effect would be if the standard of liv-

ing was raised so that mass purchasing power came about.

"Would it then result in the production of a new low priced car?" he inquired.

"We feel there is always a field below where the people want a car," replied Mr. Ford. "We feel that the more purchasing power is increased the greater the market."

Discussing the effect of technological change on the use of new capital, Mr. Ford said a recent and good illus-



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tration is the development and use of a new type of cylinder liner which is now being introduced, and made a part of the product. On March 1 of the present year, he pointed out, this was taking 12 men off the former type cylinder work, but was adding 386 men to the work in the manufacture and installation of the new part.

"In 60 days," it was said, "the added employment from this new development, which improves motor operation, lessens the amount of oil used

and decreases maintenance cost to the owner, will be about 500 men. The capital expenditure to equip the factory for this job so far has been about \$880,000. The total expenditure by the Ford Motor Co. for new and improved machinery, together with the necessary buildings during the year 1939, was about \$36,000,000."

#### Available to Small Business

It was said to be true that some technological changes in the line of

improvements and developments require much time and money and that therefore, it is believed, can be done more readily by large industries. The view was given, however, that technological advances are not beyond the use of small independent businesses, "as this company has taken advantage of such advances." Many new developments, it was pointed out, can be worked out by individuals or small business. As an illustration, mention was made of new mechanical devices or new plastic materials and parts. Work of the kind that the Ford company is doing on the industrial use of farm products, it was stated, would be in this class.

Concerning the effects of patent rights on technological developments, it was stated that when patent rights are held by those who make no effort to put them to good use, they retard development. However, it was explained, when considering modification of patent rights, there must not be overlooked the incentive given to thought and work and development by the possible compensating returns from proper use of patent rights.

"It is believed the use of some devices is retarded by the fear of capital to make the necessary investment under the present limiting conditions, whereby it shares in all the losses but in little of the profit," it was stated. "The chances against success are too great. Too, the theory of scarcity (to which this company does not subscribe) rather than of plenty is another retarding factor.

#### Full Use Comes Slowly

"Usually, full use is slower than desired. Some advances come as a series of intermittent or gradual and continual steps to the final total improvement desired. It is estimated that the time in general between the conception of an idea and its use in practice is from one to five years."

The effect of technological change, it was declared, has been and will be to increase the volume of production, to increase the number of workmen and to increase the volume of wages paid. To support this statement the committee was told that the amount of payroll and purchases for Ford Model T with its about 5000 parts in 1926 was \$454.42 while the comparable figure for the Model A with its about 6000 parts in 1929 was \$526.84 while for the Model V-8 with its about 16,000 parts in 1939 was \$683.23.

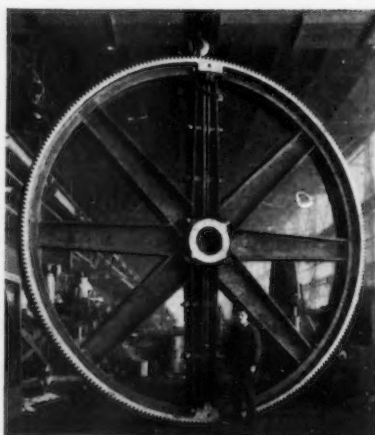
Records were said to show that during the past six years, both labor and the purchases per automotive unit pro-

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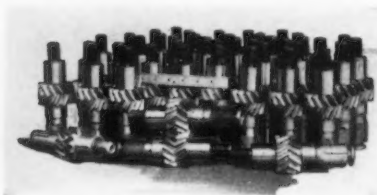


Farrel-Sykes Continuous Tooth Herringbone Gear for rolling mill drive, 217.480" outside diameter, 25" face. Transmits 800 H.P. at 360 RPM. Ratio of gear and pinion 18.12 to 1, speed of gear 19.85 RPM, peripheral velocity 1130 feet per minute. Total weight 44,900 pounds. Made of steel castings in two halves carefully machined and bolted together with fitted bolts.

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duced by the Ford company have steadily and substantially increased. During the two three-year periods ended Feb. 29, 1936, and Nov. 30, 1939, it was stated, the average daily production was almost identical, but average labor hours performed in the factories increased considerably. For the former three-year period the average daily production was given as 3276, the total hours, 448,947,000, and the average hours per unit (car), 179.13.

For the three-year period ended Nov. 30, 1939, the average daily production was 3267, total hours, 507,294,000 and the average hours per unit, 201.95. Furthermore it was shown that there was a gradual increase during the six calendar years in labor cost per unit, rising from \$119.41 in 1934 to \$197.84 in 1939.

#### Foundry Department Cited

Pointing out that the foundry department is noted for the vast amount of technological improvement and installation of so-called labor saving machinery, it was shown that the number of men per car employed in this department rose from 0.0057 in 1933 to 0.0079 in 1939. It was estimated that if manufacture by hand were followed throughout all the manufacture of an automobile the cost of making a Ford car would exceed \$17,000, that not more than 50 cars a year would be sold, that there would not be work for more than one of the 2160 men (based on the calculation that a man can make only one piece while the machine makes 2160 pieces), and none for most of the 125,000 men now in the Ford industry alone.

"Could this be avoided by paying for the hand work just what it would be worth by comparison," it was asked. "Hardly, for under that arrangement a man on this job would earn about 18c. per day.

"Three million men are normally employed in making, selling and servicing cars, because with machinery, cars can be produced at prices people can pay. And that, in turn, creates jobs at wages that enable people to buy. The cars, the jobs, the wages would not be there, were it not for machinery."

Figures for 12-month periods were submitted to show that there has been a progressive increase in both the total hours of labor and in the average hours per automotive unit produced by the Ford company. For the 12 months ended Jan. 31, 1935, with an average daily production of 3074 cars, total hours were 146,373,000, and the

average hours per unit were 186.74. For the 12 months ended Aug. 30, 1938, with an average daily production of 3115, total hours were 168,790,000 and the average hours per unit were 211.64, while for the 12 months ended Nov. 30, 1939, with an average daily production of 3069, total hours were 173,668,900 and the average hours per unit were 220.18.

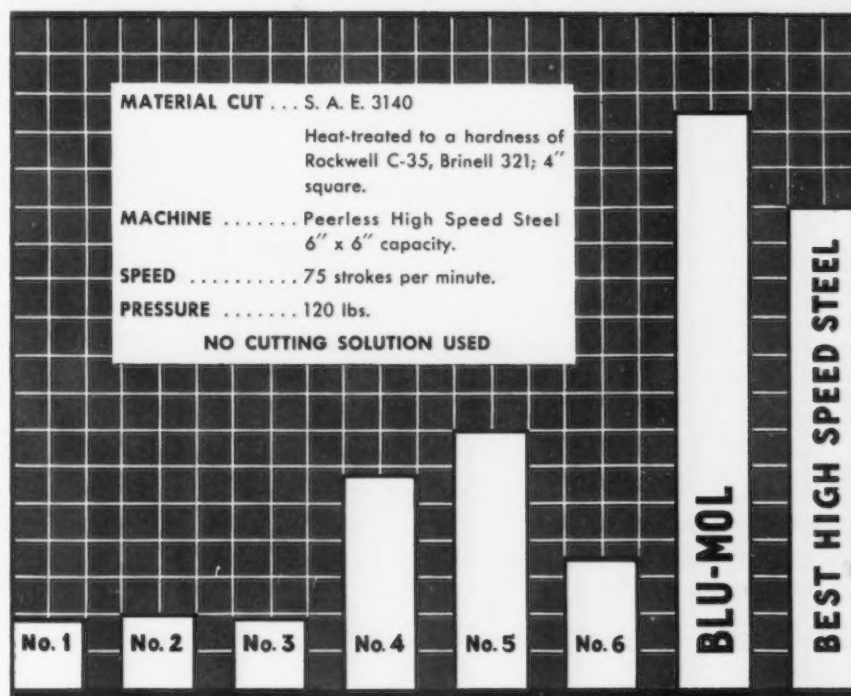
#### Purchases Increase

Figures were also given to show that along with the increase in labor

hour and labor cost per unit, the amount of purchases per unit rose. Purchases during the three years ended Feb. 29, 1936, totaled \$1,198,609,000 or \$478.24 per unit and during the three years ended Nov. 30, 1939, they aggregated \$1,259,242,000 or \$501.30 per unit.

Regarding type of ownership, it was said that results may be much more quickly accomplished where efficient compact management is demanded and developed and such management is

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given a free hand than where, due to an unduly complicated corporate structure, much red tape must be gone through before a development may be started or carried through.

The Ford company, it was stated, has no knowledge of any technological improvement that has resulted in the permanent displacement of workmen, in the sense that generally cooperative willing workmen cannot thereafter find employment. If there are isolated individuals seriously affected,

it was said undoubtedly they should be and can be compensated without impeding for the use of civilization generally the great benefits of new developments. Mr. Ford declared that his company knows of no permanent displacement of workmen in the automobile industry as under normal conditions they are absorbed in jobs created by one or another technological change. Technological change was said to have increased occupational skills, increased individual earnings

and improved the social economic status of workers, and to have made possible the use of men older and with less physical strength.

#### Ford Decentralizes

Respecting the effect of technological improvements on society, Mr. Ford said the company has 14 small plants located within a radius of 60 miles of Dearborn, Mich., in an effort to help rural communities by the decentralization of industry where possible. This is its only direct contact with "one industry towns." Where technological change has affected these plants, it has been found both convenient and desirable to make arrangements to maintain or increase the amount of labor in those places, it was stated. At the company's main plant, Mr. Ford said, it maintains its own training schools with more than 2000 students. This was said to be advantageous both for the students and the company. The belief was expressed that technological development is resulting in upgrading of workmen. It was said to make for increased purchasing power and increased standards of living. The laws of cause and effect and the natural desires of business men and employees for improvement from every social angle, said Mr. Ford, are accomplishing this without a formulated social policy.

Ford plant extension and replacement for the past six years was said to have been \$169,152,000. Plant equipment scrapped or otherwise disposed of amounted to \$96,682,000. Yet, at the end of 1939, after these important improvements in plant were made, employment by the company, for a like volume of production, stood at a 10-year peak of approximately 125,000 men.

#### Skilled Labor in Demand

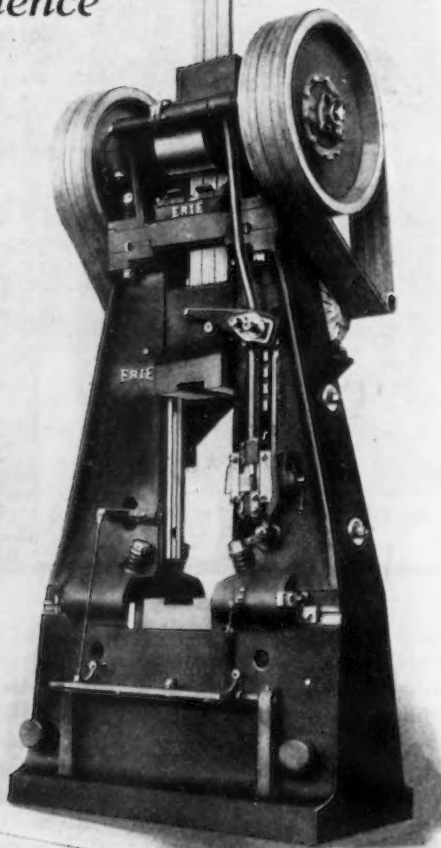
Replying to a question, Mr. Ford said that the company can get all the common labor it wants but that skilled labor is in great demand "in our area." He said that the people want a new "facial front" for cars each year and that this required skill for production. The Ford company, he stated, spends about \$5,000,000 annually on style changes alone. Asked if he saw any prospect in the near future for full employment in the automobile industry, Mr. Ford said that his company is running at the rate of about 75 per cent of capacity. He said that he could not comment on the prospect of stepping up operations to full capacity.

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that will compete," said Mr. Ford, "and hope that it will increase our output."

Mr. Ford disagreed with a suggestion that there is greater tension among workers as a result of technological development than heretofore. On the contrary, he said, that they have more leisure time than heretofore.

#### CIO Leader Testifies

R. J. Thomas, president of the CIO faction of the United Automobile Workers Union, told Senator O'Mahoney that his organization was not interested in hindering technological improvements but only in obtaining a greater share of the benefits for labor. In attempting to substantiate his claim that labor does not share adequately in the "rewards," the UAWU spokesman quoted figures on "profits" of General Motors Corp., and Ford Motor Co. and implied that hours could be shortened, employees added and wages increased by diverting funds from company "profits" to the employees. As one of the methods for achieving this, he told the committee that his union is attempting to obtain a 6 hr. day and a five-day week.

Senator O'Mahoney leaned forward in his chair, cupped his hand over one ear, called it "a very important statement" when Mr. Thomas asserted that, although automobile production last month was up to the 1929 level, there were fewer workers on the payroll. The CIO witness conceded he lacked figures to bear out his estimate but promised the Senator he would look into the subject further and report back to the committee.

#### Differs with Ford

In general, Mr. Thomas attempted to sell the committee on what he called the differences in working conditions in organized and unorganized automobile plants, attributing the changes exclusively to the work of the union, took vigorous exception to many of the statements made earlier in the day by Mr. Ford, and charged that the failure of markets to expand in proportion to productive capacity is "one of the basic causes for unemployment, insecurity and economic hopelessness of our present time."

A WPA white-collar project conducted several years ago, giving figures on production, employment and productivity in 59 manufacturing industries, was cited by the witness to illustrate his point that "while expansion of the automobile industry was providing jobs for thousands, another and contrary process—the increasing

displacement of labor by technological progress—was going on within the industry." Mr. Thomas estimated on the basis of the WPA data that man-hour productivity in the automobile industry increased from 100 in 1919 to 234 in 1929, explaining that this was equivalent to saying that a group of employees able to produce 100 cars in 1919 were able to produce with the same labor time in 1929 a total of 234 cars. Despite this increased man-hour productivity, the CIO witness

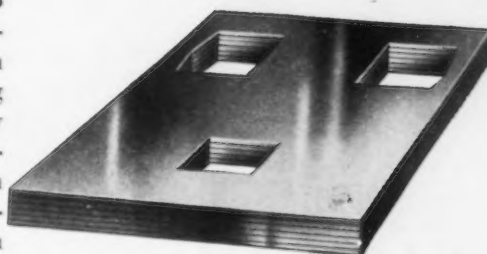
added, the WPA figures show total employment increasing 30 per cent from 1919 to 1929. He attributed this increase in the face of increasing man-hour productivity by the rise in production from an index of 100 in 1919 to 312 in 1932.

#### Displacement Increased

"The tendency of improved machinery to displace labor in the auto industry during the nineteen twenties was balanced out by a consistent expansion of production," Mr. Thomas

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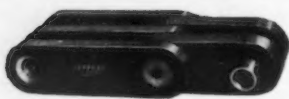
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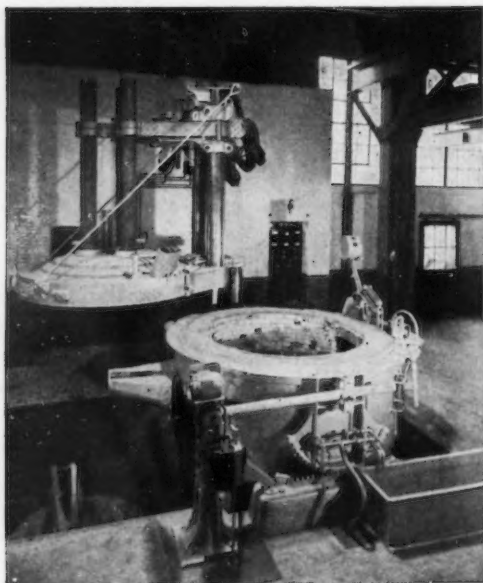
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asserted. "But when the purchasing power, which had allowed this expansion, slumped disastrously in 1929 and the years following, the story was a very different one. Accumulated relative displacement of labor became, in those years, absolute. Had something close to the 1919 level of productivity been maintained, even the low level of production from 1930 to 1934 would have insured an employment of nearly twice actual employment. But with the advance in technology, employment sank lower and lower until in 1932 and 1933 only 54 per cent of 1929's labor force was employed."

## "Men, Methods and Machines"

A study conducted by the Automobile Manufacturers Association and contained in a book "Men, Methods and Machines" by Andrew T. Court shows that during 1937 employment in automobile plants averaged 15 per cent higher than in 1929, although production lagged 10 per cent below 1929 levels; and Mr. Court concludes that there has been no aggregate technological displacement of labor in automobile factories despite the introduction of countless new and more productive machines and processes.

Mr. Thomas referred to the study, insisted that it was based in part on what he called "the admittedly unreliable figures" supplied by the Labor Department, and told the committee that the 15 per cent rise in total employment should have been 7.1 per cent and that the author failed to take into consideration the shortening of hours in the industry. This single factor is more than enough to explain a 7 per cent rise, he said, alleging that the author had resorted to "juggling" in an effort to "conceal actual technological displacement in the industry."

## Brazilian Commission To Study Steel Project

WASHINGTON—Plans for expansion of iron and steel production facilities in Brazil, which for a time at least involved the possibility of interesting United States capital in the venture, were emphasized recently during the formal installation of the Brazilian National Steel Plan Executive Commission.

Set up by government decree, the commission will make technical studies, organize a financing plan contemplating assistance from both the government and private capital, and construct and operate the plants, according to reports made by American Commercial Attache Walter J. Donnelly.



## Navy Will Build Ten New Ships

WASHINGTON — A \$963,797,-478 naval appropriation bill last week was reported favorably by the Senate Appropriations Committee. It included funds to start construction of two 45,000-ton battleships, two cruisers, one aircraft carrier, eight destroyers, six submarines and several smaller craft.

Although the measure provided for \$1,981,960 less than had been allowed in actual appropriations in the House draft, funds for continuing the shipbuilding program were left untouched. Appropriations for shipbuilding will permit the normal construction pace contemplated for 1941 under the 1938 naval shipbuilding program.

Although Navy Department officials said they saw no need to alter the program in the light of current European developments, it was considered significant that talk of supplemental appropriations was revived after Senator David I. Walsh, chairman of the Senate Naval Affairs Committee, called at the White House late last week. Moreover, the Navy Department made plans to start construction of 10 new ships and to refit three submarines without waiting for Congress to vote the funds.

Despite the paring done in the Senate draft, it authorized a \$15,000,000 increase in contract authorization for planes but this increase does not appear in the total because the money is to be provided later. A \$5,000,000 reduction from the House allotment of \$41,000,000 for new planes was approved by the Senate committee. As against these reductions, however, the committee added to the bill \$8,250,000 asked for by the President to improve shipbuilding facilities at Government Navy Yards.

## New Iron Ore Deposits Discovered in India

WASHINGTON—Recent discovery of magnetite in Bihar Province, India, points the way, according to some observers, to the possibility of electric smelting. Commerce Department reports from Calcutta are that the new deposits are regarded as important because of the current heavy demand for iron and steel. The report noted that magnetic ores were represented in the report as being more amenable to electric treatment than the hematite ore now used in India's iron and steel works.

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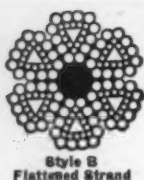
CUPRODINE is made by the manufacturers of RODINE, a standard inhibitor wherever steel is pickled. Write for particulars on either or both of these products.



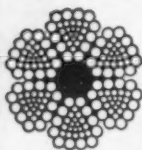
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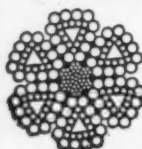
Walkerville, Ont.



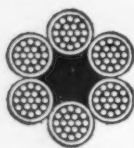
Style B  
Flattened Strand



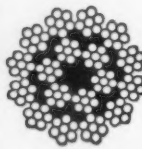
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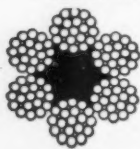
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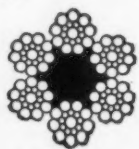
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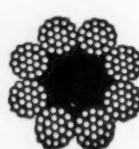
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## Norwegian Waters Banned to U. S. Ships

WASHINGTON—In the face of European developments involving Norway, Denmark and Sweden, President Roosevelt last week extended the previously defined European combat zone (See THE IRON AGE, Nov. 9, 1939, p. 79-D) to include all the Scandinavian countries.

The forbidden area, from which American ships are banned, now includes virtually all of Europe with the exception of Portugal, the west coast of Spain and the Mediterranean.

A Commerce Department summary of United States trade with Sweden, Norway, Denmark and Finland showed that principal products exported to these countries by the United States in 1939 included automobiles, machinery, petroleum products, raw cotton, iron and steel, copper, foodstuffs, and tobacco. Larger direct shipment of a number of these commodities, including iron and steel, accounted for an increase in value of exports during 1939.

Iron and steel exports to Norway reached 42,533 tons in 1939 as against 12,152 tons in 1938. Sweden imported 146,226 tons of iron and steel from the United States as compared with 31,418 tons in 1938. Second largest import group from both Sweden and Norway consisted of ores and metals. This country imported 24,037 tons of iron and steel from Sweden in 1939 and 15,373 tons in 1938. Imports of iron and steel from Norway—principally ferro-manganese—increased from 14,615 tons in 1938 to 20,877 tons in 1939.

### Value of Exports

Out of a total of \$4,983,000 worth of metals and manufactures exported to Norway in 1939, pig iron exports were valued at \$123,000; plates and sheets, \$1,045,000; tin plate, \$652,000; bars and rods, \$205,000. Out of \$5,759,000 worth of machinery and vehicles exported to Norway in 1939 industrial machinery was valued at \$1,078,000, of which machine tools represented a value of \$170,000; agricultural machinery, \$622,000; automobiles, parts and accessories, \$2,132,000.

Exports to Sweden in 1939 included pig iron valued at \$1,323,000; steel scrap, \$1,323,000; plates, \$1,990,000; black sheets, \$1,055,000; tin plate, \$1,055,000; machine tools, \$1,414,000; agricultural machinery, \$3,188,000; and automobiles and parts, \$12,252,000.

Principal United States imports from Norway during 1939 included iron ore valued at \$845,000; and ferro-manganese, \$1,910,000. Imports from Sweden in 1939 included iron ore



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valued at \$1,228,000; ingots, bars, rods, \$1,643,000 and flat wire and steel strip, \$1,643,000.

### Allies Can Now Buy 3 Newest U. S. Planes

WASHINGTON—The War Department last week gave the go-ahead signal to release for export three of the Air Corps' newest type pursuit planes. Aircraft released included the Bell P-39, or Aircobra; the Lockheed P-38, a two-motored interceptor craft; and an improved model of the Curtiss P-40.

The action was expected to clear the way for placing with aircraft manufacturers an estimated \$1,000,000,000 order for some 8000 military planes and 13,000 engines desired by the French and British governments. Actual award of contracts had been delayed by the contention of Allied purchasing agents that anything less than the latest types would be outclassed by the date of delivery.

The Army will be the first to feel the pinch of diverting warplanes to European belligerents and already has been forced to accept deferred deliveries. Secretary of War Woodring has reported to Congress, however, that the policy actually will protect the Army's investment and assure more advanced ships for the Air Corps.

The Navy has about 1000 planes on order and is expected to obtain delivery on schedule despite the arrangements just made for increased European purchases. Rear Admiral John H. Towers, chief of the Navy's Bureau of Aeronautics was reported to have told a Senate Appropriations sub-committee that the Navy anticipated no delays from British and French plane purchases.

### Cuba Steel Imports Double Last Year's

WASHINGTON—Imports of iron and steel products into Cuba during the first two months of this year more than doubled the corresponding total for 1929, according to unofficial compilations transmitted to the Commerce Department. While imports from the United States registered sharp increases, shipments from Europe were only a fraction of their 1939 volume. Orders placed during the first quarter this year were represented as being under the level for the corresponding period in 1939.

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## Minority Criticizes Changes Proposed for Wagner Act

WASHINGTON—Wagner Act amendments relating to collective bargaining for craft units, previously approved by a majority of the members on the House Labor Committee, were criticized in a minority report last week by the remaining seven members of the committee.

The minority said that the amendments contained in the bill proposed by Representative Mary T. Norton, chairman of the committee, would "produce bitter internal dissension among the workers, cause industrial disputes and bring about the nullification of the purposes of the act." The amendment to which the minority report took particular exception would require the board to recognize craft unions for purposes of collective bargaining when a majority of a workers unit decided it wants such representation.

In the words of the dissenters, the Norton amendment would compel establishment of craft units not only for groups of craft employees who have historically been organized along craft lines "but also among many other groups of so-called craft employees among whom there has been no history and no real development in craft organization."

### Proper Unit a Problem

Members of the minority explained that determination of the proper unit was the most perplexing problem before the board whose policies, they said, have been eminently fair to the craft unions. The policies of the NLRB in this respect, it was said, have meant that employees in the craft group may decide whether they wish to be in a separate craft unit or to be part of a large unit including the craft group.

Joining in the dissent were Representatives Frank W. Fries, of Illinois; Kent E. Keller, of Illinois; Thomas D'Alesandro, Jr., of Maryland; Matthew A. Dunn, of Pennsylvania; Jennings Randolph, of West Virginia; John Lesinski, of Michigan, and Gerald W. Landis, of Indiana.

Defeat of the Norton craft union amendment was also the aim of an extensive lobbying campaign launched by the CIO.

"Every industrial union sees in the craft union amendment proposed in the Norton bill a threat to its very

existence," said John T. Jones, president of the Washington industrial union council, who was appointed to head the campaign by CIO Generalissimo John L. Lewis.

The AFL was quick to take a crack at the cries set up by the CIO. "The CIO and its sympathizers can shout from the house-tops but they cannot change the facts," declared George Meany, a secretary-treasurer of the AFL in a letter to Chairman Norton. "And these facts make their opposition to your amendment appear ridiculous."

Commending Mrs. Norton for her action in including the amendment,

### Duraluminum Coaches Tried Out in Italy

WASHINGTON—Duraluminum coaches weighing 33 tons as compared with the 45-ton weight of conventional coaches have been given successful trial runs in Italy, according to claims made in a dispatch to the Commerce Department. Assembled on long frames and equipped with special springs to reduce vibration, the new coaches are 69 ft. in length and described as being sheathed with a thick plate of duraluminum covering the roof and doors.

### Wright Aeronautical Buys Another Plant

WRIGHT AERONAUTICAL CORP., Paterson, N. J., a division of Curtiss-Wright Corp. and one of the largest builders of aircraft engines in the United States, has purchased the plant and grounds of the Textile Dyeing & Printing Co. of America, Inc., at Fairlawn, N. J., just across the Passaic River from Paterson, although several miles from the main Wright plant. The newly acquired factory which has a floor space of 450,000 sq. ft., mostly on ground level, will house the connecting rod and crankshaft departments. The dyeing plant had been idle since 1938.

The Wright company was organized in 1919 and went to Paterson soon thereafter, when it employed 300 people and used 100,000 sq. ft. of space. It now employs 6000 to 8000 persons

Mr. Meany said the amendment was "taken word for word" from the New York State Labor Relations Act and that it "had worked well."

"It is not the proper function of the Labor Board to impose the union of its choice on the workers," he continued. "The purpose of the act is to give workers the right to choose their union for themselves. Your amendment will effectuate this fundamental objective. The American Federation of Labor, therefore, gives it whole-hearted support."

In an initial move aimed at heading off Wagner Act amendments, Labor's Non-partisan League, CIO adjunct, announced that delegations of union representatives from nine states would confer with members of Congress all this week to give "first-hand information on the workings of the Wagner Act in the various states."

and occupies well over 1,000,000 sq. ft. of space. It is just completing a large addition on Getty Avenue, Paterson, on a site next to the aluminum foundry. About 1000 men will be employed in the Fairlawn plant when machinery is transferred there. Foreign and domestic orders have made expansion necessary. A large amount of machinery has been purchased in connection with the expansion program.

### Carnegie-Illinois to Build New Blast Furnace

CLEVELAND—Arthur G. McKee & Co., Cleveland engineers and contractors, report the receipt of a contract from Carnegie-Illinois Steel Corp. for the design, fabrication and construction of a new blast furnace, together with a new cast house, gas mains, gas cleaning equipment and certain other accessory equipment, to replace the corporation's present No. 3 blast furnace at its Carrie furnace plant, Rankin, Pa.

### Sterling Foundry Will Erect Two New Buildings

WELLINGTON, Ohio—A contract has been signed with Austin Co., Cleveland, for erection of two buildings for Sterling Foundry here, R. E. Clisby, president, says. The expansion coincides with an expansion of the Warner & Swasey Co. factory in Cleveland for which nearly all Sterling Foundry castings are made.

## House Passes Bill Providing \$100,000 Labor Cost Study

WASHINGTON—While the Temporary National Economic Committee was exploring the subject of technological advances and their effect upon labor last week, the House passed and sent to the Senate a bill calling for a \$100,000 study of productivity and labor costs in industry to be made by the Labor Department's Bureau of Labor Statistics.

Strong opposition was voiced by Representative Charles L. Gifford, Republican, who characterized the bill as "another method to bolster arguments favorable to this Administration," but when called up for a vote the measure passed by a count of 307 to 14. An identical bill was also called up in the Senate last week but was passed over.

Read into the record during debate on the measure in the House was a statement by the AFL complaining that present data from the Labor Department are insufficient, a letter from the Labor Department reminding the Congress that its Bureau of Labor Statistics is "the appropriate agency" to conduct the inquiry, and repeated reference to the current TNEC investigation, and the assertion that at present there is no agency assembling data on the effects of technological changes.

### U. S. Should Be Informed

A. F. Hinrichs, acting commissioner of the Bureau of Labor Statistics, who was an active participant in the questioning during the TNEC hearings, said in a letter to Representative Reuben Wood, Democrat of Missouri, the bill's sponsor:

"It is important that some public agency, such as the Bureau of Labor Statistics should keep constantly informed of the development of new techniques in leading industries, by means of periodic studies, and should determine the changes in the productivity per man-hour of labor, the ensuing changes in labor costs, and the extent of displacement of labor.

"Revolutionary technical changes are generally known to members of the industry long before they are widely introduced or are known to the general public, and the problems they involve can often be foreseen before a major change occurs. It should be possible by bringing the matter to the attention of industry, labor, and

the public in the localities concerned to find some way to ease the situation created by that change."

### Study to Be Continued

Originally introduced at the suggestion of the AFL, the measure as reported favorably last session by the House Labor Committee provided for the establishment of a division of labor productivity in the Department of Labor. As passed by the House, however, the existing divisions in the Department would conduct the studies. Although the measure authorizes \$100,000 to be spent the first year, the bill contemplates future expenditures since it calls for "continuing studies."

Passage of the measure by such overwhelming odds has been interpreted by some observers as indicative of the popular misconception in Congress that the machine is responsible for unemployment. The measure, according to sponsors, has "the approval of all labor groups as well as most of the manufacturers of the country."

## Government Orders

WASHINGTON — Government contracts for iron and steel products, as reported for the week ended April 6 by the Labor Department's Public Contracts Division, totaled \$993,447. For the same period, contracts aggregated \$268,122 for non-ferrous metals and alloys; \$517,342 for machinery. Details follow:

### Iron and Steel Products

Darby Products of Steel Plate Corp., Kansas City, Kan., Panama Canal, steel tank units .....	\$12,684
Hardie-Tynes Mfg. Co., Birmingham, Ala., War Engineer Corps, conduit lining .....	52,213
The Stanley P. Rockwell Co., Hartford, War Ordnance, furnace equipment .....	22,500
Diebold Safe & Lock Co., Canton, Ohio, War Ordnance, mortar parts .....	27,580
Youngstown Sheet & Tube Co., Youngstown, Ohio, War Ordnance bar steel .....	18,475
Virginia Bridge Co., Memphis, Tenn., War Engineer Corps, steel pipe .....	26,885
Joshua Hendy Iron Works, San Francisco, Interior Reclamation, high-pressure gates .....	21,499
Bethlehem Steel Co., San Francisco, Interior Reclamation, reinforcement bars .....	48,300
Bethlehem Steel Co., San Francisco, Interior Reclamation, reinforcement bars .....	12,556
Edwards Mfg. Co., Cincinnati, Navy S&A, practice bombs .....	79,166
Upson-Walton Co., Cleveland, Navy S&A, steel anchors .....	12,305
Link-Belt Co., Philadelphia, Navy S&A, chains .....	35,579
Crucible Steel Co. of America, New York City, Navy S&A, steel forgings .....	43,100
Pittsburgh Steel Co., Pittsburgh, Navy S&A, steel pipe .....	9,610
Union Wire Rope Corp., Kansas City, Panama Canal, wire rope .....	11,431
Superior Steel Door and Trim Co., Inc., College Point, N. Y., TVA, partitions, doors, frames, hardware .....	17,205

Carnegie-Illinois Steel Corp., Birmingham, Ala., TVA, steel sheet piling .....	65,018
J. M. Tull Metal & Supply Co., Inc., Atlanta, Procurement, drills .....	Indefinite
Bethlehem Fabricators, Inc., New York City, WPA, structural steel .....	22,509
Jones & Laughlin Steel Corp., Pittsburgh, WPA, wire .....	10,535
Consolidated Steel Corp., Ltd., Los Angeles, War Engineer Corps, crest gates .....	107,884
C. H. Cowdrey Machine Works, Fitchburg, Mass., War Ordnance, howitzer .....	174,208
National Tube Co., Pittsburgh, War Ordnance, shell forgings .....	134,384
J. R. Hunt & Co., Baltimore, War QMC, motor maintenance equipment .....	27,826

### Non-Ferrous Metals and Alloys

American Brass Co., Waterbury, Conn., Navy S&A, copper-nickel tubing .....	\$51,904
Aluminum Co. of America, Atlanta, TVA, conductor .....	12,750
Leitelt Brothers, Chicago, War Ordnance, bronze castings .....	14,454
Pacific Metals Co., Ltd., San Francisco, Navy Purchasing Office, nickel-copper-alloy .....	20,991
Walter Kidde & Co., Inc., New York, Procurement, fire extinguishers .....	Indefinite
Aluminum Co. of America, Pittsburgh, War Air Corps, aluminum alloy .....	35,036
Chrysler Corp., Detroit, War Ordnance, bomb fuzes .....	97,079
Chase Brass & Copper Co., Inc., Waterbury, Conn., War Ordnance, metal bands .....	21,460
Bohn Aluminum & Brass Corp., Detroit, War Ordnance, signal bodies .....	14,446

### Machinery

C. H. Wheeler Mfg. Co., Philadelphia, Navy S&A, air ejectors .....	\$46,280
G. H. Tennant Co., Minneapolis, Procurement, polishing machines .....	Indefinite
Potter & Johnston Machine Co., Pawtucket, R. I., War Ordnance, chucking machines .....	23,600
Niles-Bement-Pond Co., Pratt & Whitney Division, Hartford, War Ordnance, reaming machines .....	34,200
H. A. Smith Machinery Co., Syracuse, N. Y., War Ordnance, engine lathe .....	20,450
Bay City Shovels, Inc., Bay City, Mich., War QMC, power shovel .....	12,700
Joshua Hendy Iron Works, San Francisco, Interior Reclamation, tube valves .....	26,249
The American Tool Works Co., Cincinnati, Navy S&A, engine lathe .....	36,677
Henry Prentiss & Co., Inc., New York, Navy S&A, turret lathes .....	17,739
Buffalo Forge Co., Washington, Navy S&A, ventilation equipment .....	48,180
Northern Pump Co., Minneapolis, Navy S&A, fuel oil pumps .....	202,177
Virginia Bridge Co., Roanoke, Va., TVA, valves, bulkheads .....	15,597
Black & Decker Mfg. Co., Van Dorn Electrical Tool Co. Division, Towson, Md., Procurement, drills, grinders, etc. ....	Indefinite
Colson-Merriam Co., Washington, D. C., Veterans Administration, food conveyors .....	14,733
Allis-Chalmers Mfg. Co., Milwaukee, War Air Corps, tractor-mowers .....	18,759

## Navy Bureau Awards

WASHINGTON—Contracts have been awarded by the Bureau of Supplies and Accounts, Navy Department, as follows:

American Tool Works Co., Cincinnati, engine lathes, \$23,806; United Aircraft Corp., Hamilton Standard Propeller Division, East Hartford, blades and hubs for airplanes, \$52,110; Breeze Corporations, Inc., Newark, N. J., doors, hatches and scuttles, \$85,564; Mitchell Metal Products, Inc., Cleveland, extractors for cartridge cases, \$28,350; Howard Foundry Co., Chicago, waterproof protecting cap assemblies, \$93,097; M. Grumbacher, New York, brushes, \$5,696; Heppenstall Co., Pittsburgh, shafts and forgings, \$47,700; Grabler Mfg. Co., Cleveland, iron pipe fittings, \$8,676; International Nickel Co., New York, nickel-chromium alloy, \$21,600; and the Wright Aeronautical Corp., Paterson, N. J., compressor and turbine aircraft engine, \$28,412.



# Detroit A. S. M. Hears A. B. Kinzel Discuss Steel Alloying Elements

**D**ETROIT—National officers of the American Society for Metals attended the April 8 meeting of the Detroit chapter at which Dr. A. B. Kinzel, chief metallurgist of Union Carbide & Carbon Research Laboratories, lectured on "Effects of Alloying Elements in Steel." Attending the session as guests of the Detroit group were James P. Gill, national president, and W. H. Eisenman, national secretary. The meeting was also featured by an announcement that a widely shown film of W. P. Woodside, Climax Molybdenum Co., is being sealed for opening 23 years from now, on the 50th anniversary of the founding of the original heat treaters group in Detroit.

Dr. Kinzel endeavored to give a bird's-eye view of the effects of all the ordinary alloying elements, starting with the most simple combinations and leading up to the more complex modern multiple alloy steels. It was pointed out that the three most important elements in steel making are sometimes neglected, those frequently overlooked being iron, carbon and oxygen.

All the ordinary alloys were divided into three groups in Dr. Kinzel's consideration of their effects. He suggested the arrangement:

Alpha Forming Elements (1) Carbide Formers (2) Deoxidizers		Gamma Forming Elements (3)
Chromium	Silicon	Manganese
Molybdenum	Aluminum	Nickel
Vanadium	Calcium	Copper
Tungsten	Zirconium	Cobalt
Titanium		Lead
Columbium		Phosphorus
		Sulphur

## Then Came Multiple Alloys

The older steels were generally quite simple and in that state, Dr. Kinzel said, carbon was used to control physical properties, particularly ductility and strength. The increasing importance of the welding steel necessitated lowering the carbon content at a sacrifice in strength. The gradual development of the simple alloy steel was followed by more complicated multiple alloys, greatly in use at present. Obviously, introduction of each of the alloy steels was intended to meet increasing service demand for greater strength, impact resistance, weldability, corrosion resistance or hardenability. The effects of alloys on hardenability are becoming increasingly important, Dr. Kinzel asserted,

indicating that interesting developments are expected along these lines.

The bearing of furnace practice on successful alloys, particularly the effect of furnace practice on inclusion deserves continued consideration, according to Dr. Kinzel. The inclusions, he said, should be reduced to a reasonable minimum but it is of the greatest importance that they be of the proper size and shape.

Remarkable results are obtained, particularly in Europe, with a low alloy steel containing three per cent chromium and 0.50 per cent molybdenum, according to the speaker. In a discussion of this alloy, he attributed to it excellent physical properties along with the ability to be case-hardened, nitrided and otherwise treated.

## "Exit" for Carbon

Medium alloy steels, used mostly for strength at high temperatures and for resistance to oxidation and corrosion, include the well-known 4-6 per cent chrome-molybdenum steel so popular in oil service. It was stated that welding embrittlement had caused concern at first because it was found that carbon had to be reduced under 0.05 per cent to prevent such embrittlement. Although this step was regarded as not practical, it was found that carbon could be, so to speak, put out of commission by the use of titanium or columbium in these wrought steels.

Hot work effects on grain size, and the necessity for decreasing grain size in some cases, were treated by Dr. Kinzel in his discussion of high alloy steels. It was thought that a process of nucleation might be the answer, and research proved that chromium nitrides gave satisfactory results, hence the use of high nitrogen-chromium.

Alleging that about 98 per cent of the conversations on corrosion of 18-8 steel centered on intergranular corrosion, Dr. Kinzel pointed out that actually only about 2 per cent of these steels had ever been subjected to this corrosion. Some steels, he said, are subjected to embrittling temperatures with or without corrosion, and where such attack might take place the addition of titanium or columbium to the steel again ties up the carbon in a harmless form. Under severe conditions, he asserted, columbium gives complete immunity to intergranular corrosion. Pitting of stainless steel by chlorides has been the subject of

research which showed that molybdenum was a preventive, he added.

Dr. Kinzel touched on the disadvantage of mixed microscopic structures and showed how nickel had been increased, then manganese increased and various other changes made.

Dr. Kinzel's lecture and reply to questions covered various phases of the manufacture and physical properties of the 3 per cent chrome-molybdenum steel, nitriding, the effects of titanium and columbium, and expected recoveries, the best types of welding rods for use with these steels and deoxidation practice in their furnacing. Also the effect of hydrogen, of pouring temperatures on grain size, the use of calcium, aluminum and zirconium in various steels were covered briefly.

## Steel Warehouse Association Elects

**C**LEVELAND — The following chapters of the American Steel Warehouse Association have elected officers for the coming year, according to W. S. Doxsey, executive secretary, Terminal Tower, Cleveland.

Missouri Valley chapter: president, Arthur W. Williams, Drake-Williams-Mount Co., Inc., Omaha, Neb.; vice-presidents, G. E. Heimovics, Milcor Steel Co., Kansas City, Mo., and E. Anderson, Henry & Robinson Hardware Co., Omaha, Neb.; secretary-treasurer, F. L. Evans, Steel Mfg. & Warehouse Co., Kansas City, Mo. Mr. Williams will also serve as national director.

Northwest chapter: president, L. H. Williams, Williams Hardware Co., Minneapolis, Minn.; vice-president, Joseph Paper, Paper, Calmenson & Co., St. Paul, Minn.; secretary, Winter Dean, Nichols, Dean & Gregg, St. Paul, Minn. Mr. Williams will also serve as national director.

Northern Ohio chapter: president, F. W. Krebs, Super Steels, Inc.; vice-president, W. O. Kurtz, Peninsular Steel Co.; secretary-treasurer, R. M. Beutel, Paterson-Leitch Co.; national director, F. A. Michell, S.A.E. Steels, all of Cleveland.

Northern California chapter: president, J. R. Winzeler, Federal Pipe & Supply Co.; first vice-president, H. E. Oliphant, Tay-Holbrook, Inc.; second vice-president, Ralph Petillon, Ducommun Metals & Supply Co.; secretary, R. D. Cortelyou; all of San Francisco. Mr. Winzeler will also serve as national director.



## Henry Booth Heads Acetylene Association, O. C. Voss Honored

**M**ORE than 2500 persons registered last week for the 40th annual convention of the International Acetylene Association, a gathering which saw Henry Booth, sales manager of Shawinigan Products Corp., New York, elected president of the association to succeed H. P. Dolisie, managing director, Canadian Liquid Air Co., Ltd., Montreal.

The convention, held in Milwaukee, awarded the James Turner Morehead medal for 1939 to Otto C. Voss, a superintendent of Allis-Chalmers Mfg. Co.'s tank and plate shop at Milwaukee, for continuous pioneering, untiring educational effort, and constructive sponsorship of oxyacetylene process applications.

At the same time the association elected E. L. Mills, Bastian-Blessing Co., Chicago, as vice-president to succeed Mr. Booth and for the ninth time elected H. F. Reinhard, Union Carbide & Carbon Co., New York, secretary. Three directors reelected were C. O. Epperson, National Cylinder Gas Co., Chicago, W. C. Keeley, National Carbide Corp., New York, and H. A. Smith, Union Carbide & Carbon Co., New York.

### Here's Something Good

A highlight of the Milwaukee gathering (April 10-12) was the award to Mr. Voss, a long-time employee of Allis-Chalmers. Said Mr. Voss: "What

did I do? Sure we have developed many things with welding at Allis-Chalmers. But why not? When that thing was new 32 years ago, I just told them at Allis-Chalmers, here comes something good, let's go in for it. It looked to me like a money maker. So I told the heads of the company and they said: 'Sure, try it out, but who knows anything about it?'

"That was it," Mr. Voss said. "Nobody knew anything about it. It was try this and try that. There were no men who could be hired. You had to train them. But I tell you Milwaukee has good material for new things. We had to try different kinds of wire for the welding. So many kinds we tried. I can't tell you how many, and how many steel companies we worked with to get what we wanted. There is nothing you cannot do by welding."

Dr. Eugene L. Walsh of Northwestern University said at one session of the convention that the general health of oxyacetylene welders now appears to be better than that of other employees working in the same plant while Dr. A. G. Cranch, New York industrialist toxicologist, declared that a welding operator is less exposed to carbon monoxide than a traffic policeman during heavy automobile travel, and Dr. O. A. Sander, Milwaukee, said the welding hazard in that city is low because there are so few projects in which space is confined.

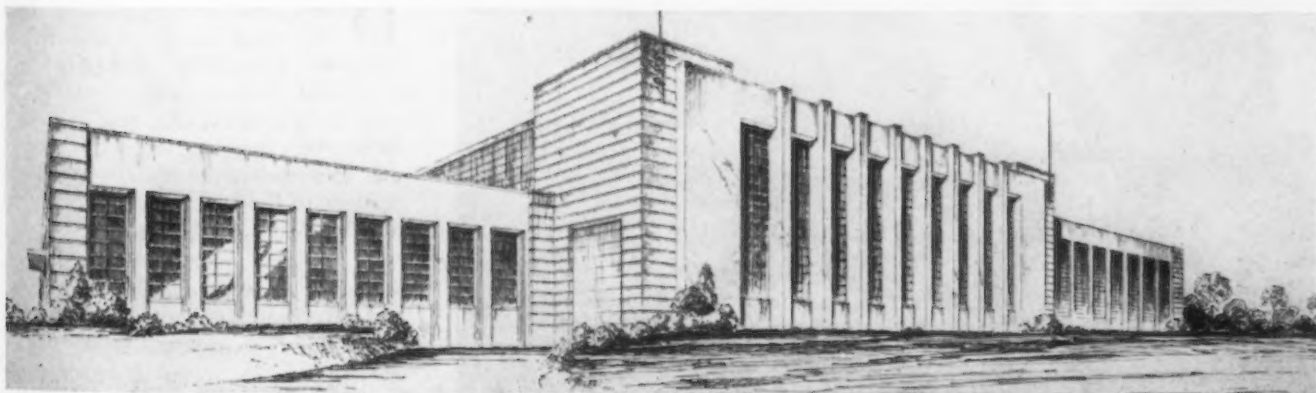
A special lecture on "Machine Flame-Cutting" was delivered by H. C. Boardman, research engineer, Chicago Bridge & Iron Co., Chicago, and a past president of the American Welding Society, at a discussion session headed by J. H. Zimmerman, development manager, Linde Air Products Co., New York. Other technical sessions dealt with "Foundry and Heavy Industry Applications of the Oxyacetylene Process," "Speeding Fabrication and Production," "General Applications of the Oxyacetylene Process," and "Reclamation, Repair and Maintenance."

The acetylene association's two films "The Prosperity Process" and "Profits of Progress" were shown at 86 meetings to 6000 persons in the past year, Secretary Reinhard reported. The association has cooperated with the Bureau of Explosives and the Interstate Commerce Commission in revising regulations for transportation of explosives. Two new company memberships and four new individual memberships were reported. Two new pamphlets, "Flame Hardening by the Oxyacetylene Process" and "Pipe Welding by the Oxyacetylene Process," are being prepared for the association.

### Warehouse Association to Meet in New York, May 21-22

**C**LEVELAND — The American Steel Warehouse Association, Inc., will hold its thirty-first annual convention at The Plaza, New York City, May 21 and 22.

**C**ONTRACTS for construction of the new foundry building sketched below have been let by Cincinnati Milling Machine Co., Cincinnati. Plans call for completion by Oct. 1 of the building, a 400x660 ft. brick and steel structure consisting of high bay monitors with concrete roof-tile construction and cork insulated roof. Installation of equipment providing for a continuous cycle of molding, pouring, shake-out, cleaning and painting of castings, is to be completed by Nov. 1, according to Frederick V. Geier, president.



## What Hurts Industry Hurts Everyone, Stettinius Warns

**A**MERICAN industry is not a thing apart from the American people but is their common source of livelihood, Edward R. Stettinius, Jr., declared last week in address before the Economic Club at Chicago. Hence the public (Government) should, he said, "use good judgment" in undertaking to define through laws the relationships between businessmen.

The U. S. Steel Corp. chairman said he merely "wished to leave for contemplation" the decision as to whether new concepts of the past 10 years as to the relative functions of the Government and industry are wise.

"In recent years," he said, "we have observed important extensions in public control of industry. Many of these changes had origins in the World War and in the severe depression which has characterized the decade just

passed. While the movement has not been confined to the United States, in some respects it has been important and impressive in this country. Thus, we find ourselves practicing the philosophy that government should assume responsibility for mitigating public ills.

"In one field of economic life (agriculture) it has undertaken to direct, in considerable detail, the step-by-step processes of production and of marketing, and to regulate the prices of agricultural products. Government has also experimented with the direct regulation of industrial conduct, of prices and of competition, and through legislation relating to wages and hours has established as a public policy that people shall be employed only under certain conditions.

"Not so consciously but nevertheless realistically," said Mr. Stettinius,

"the Government has undoubtedly diminished some of the incentives which formerly stimulated industry to progressive effort. For example, by increased taxation of profits and income, it has made it less attractive, for those who are financially able to do so, to undertake the risk of new enterprise.

"The important thing is that we, the public, should recognize that we have an elemental and direct responsibility to ourselves when dealing with industry. When we help American industry, we help ourselves and when we hurt it, we hurt ourselves."

### Foundrymen, Scrap Dealers Are Urged to Cooperate

**A** PLEA for closer cooperation of foundry consumers of scrap with the scrap trade was made by Edwin C. Barringer, executive secretary, Institute of Scrap Iron and Steel Inc., New York, at a meeting April 11 of the Northeastern Ohio Chapter of the American Foundrymen's Association at Cleveland.

"If foundries would keep their scrap suppliers advised of their requirements they would make a measurable contribution toward stabilizing the market and avoiding the peaks in prices, which are injurious to consumers and dealers alike," said Mr. Barringer.

"Because foundries must purchase, on the average, 70 per cent of their metal raw materials in the open market, a closer tieup with scrap dealers is more important to foundries than to steel mills, who are self-contained for all of their pig iron and one-half of their scrap," he said.

### Scrap Consumption Lower; Exports Below 1939 Rate

**D**OMESTIC consumption of iron and steel scrap in March at 2,932,000 gross tons showed only a fractional decline from the 3,054,000 tons of February, but represented a substantial increase over the 2,634,000 tons melted in March, 1939, according to the Institute of Scrap Iron and Steel Inc., New York.

In the first quarter, domestic consumption of scrap has totaled 9,761,000 tons, compared with 7,442,000 tons in the first quarter of 1939. However, there has been a considerable shrinkage from the 11,804,000 tons melted in the final quarter of 1939.

### World's Largest Blast Furnace

**C**AN you find the man on top of this large blast furnace, the Warren, Ohio, stack of Republic Steel Corp., which was rebuilt and enlarged in 1939, making it the "world's largest furnace?" The stack has a daily capacity of 1350 net tons.



# Europe's Steel Export Trade Largely Restricted to Belgium-Luxemburg

ROME—According to reports received here from various European countries, the export demand for European steel is disappointing. The Belgian-Luxemburg steel industry is getting a large share of the business that is available. Neither France nor Germany is taking any overseas steel trade, Germany because of the blockade and France because every ton of steel is needed in the country.

Luxemburg's production is but slowly recovering and her sales for export are still restricted. Britain is reported to be selling chiefly to her dominions and colonies, also on a restricted scale. Italy is selling only to her own empire while Sweden is exporting only high grade and not commercial steel. (Editor's Note: This was written before the invasion of Norway).

The total quantities that Europe is

sending to markets in America, Africa, Australia and Asia is estimated here to be below 250,000 tons a month, including pig iron and semi-finished steel, less than half the normal shipments of the countries participating.

In these circumstances prices are said to have been well maintained. As there are only a few sellers, the regulation of prices is wholly in their hands, subject to whatever prices are quoted by United States mills.

The German steel industry has signed an agreement with the Hungarian steel works by which competition in the Balkans is excluded. Hungary is getting a share of the trade, but her exports are small. The coal agreement with Italy is now extended to cover steel, and it is believed here that nearly 100 per cent of Italy's steel import requirements will be met by Germany. The amount of Germany's steel exports are not known, but re-

ports from Swiss and Balkan sources indicate that steel orders placed in Germany have been executed without undue delay.

With the opening of navigation on the Danube, movement of large quantities of Rumanian and Bulgarian iron ores, which were stored at Galatz, Rustchuk and Braila, are being shipped by the Danube to Germany.

Belgian works have received the largest single railway car order for export in their history. It consisted of 6180 cars, mostly for coal and other bulk goods, from the French Government.

Bulgaria has abandoned all import duties on most iron and steel products. The French Government has also abandoned import duties on many iron and steel products.

In Italy three iron ore extracting operations have been established on the shores near Rome, where iron ore of 36 to 38 per cent iron will be extracted from sand by a new process.

Greece is to get its first steel tube plant. The A. G. Bisol is constructing it at Kallitha with German equipment. Capacity at first will be 2000 tons of tubes annually.

## Iron and Steel Imports to the United States (In Gross Tons)

	February		Two Months Ended February	
	1940	1939	1940	1939
Pig iron	2,032	603	3,946	1,189
Sponge iron	160	266	172	300
Ferromanganese <sup>1</sup>	1,595	2,889	3,540	6,039
Spiegeleisen	169	2,033	247	3,009
Ferrosilicon <sup>2</sup>	40	273	309	347
Ferrosilicon <sup>3</sup>	100	7	150	32
Other ferroalloys <sup>4</sup>	273	1,413	715	4,746
Iron and steel scrap	4,369	7,484	9,079	15,662
Pig iron, ferroalloys and scrap				
Steel ingots, blooms, etc.	22	7	226	14
Billets, whether solid or hollow	499	711	1,536	1,907
Wire rods	521	718	1,762	1,922
Semi-finished steel				
Concrete reinforcement bars	196	63	385	163
Hollow bar and drill steel	148	1,385	548	3,573
Bars, whether solid or hollow				
Iron slabs	39	79	124	129
Boiler and other plate (including skelp)	1	96	28	267
Sheets, skelp and saw plate	20	96	28	267
Die blocks or blanks, etc.	6	2	6	2
Tin plate, taggers' tin and terneplate	11	12	14	15
Structural shapes	83	2,412	299	5,946
Sashes and frames		5		5
Sheet piling	186	146	295	387
Rails and track material		217		487
Welded pipe	193	1,137	605	7,687
Other pipe				2
Cotton ties	52	1,670	357	3,564
Other hoops and bands		1,654		2,666
Barbed wire	120	282	320	567
Round iron and steel wire				1
Telegraph and telephone wire	237	166	467	436
Flat wire and steel strips	82	134	163	374
Wire rope and strand		251		491
Other wire	7	796	45	1,349
Nails, tacks, and staples	19	6	24	18
Bolts, nuts, and rivets		63	3	108
Horse and mule shoes				
Rolled and finished steel	1,400	10,149	3,685	28,764
Cast iron pipe and fittings	419	100	419	132
Malleable iron pipe fittings		15		15
Castings and forgings	31	94	69	318
Total	6,740	19,149	15,014	46,813

<sup>1</sup> Manganese content; <sup>2</sup> chrome content; <sup>3</sup> silicon content; <sup>4</sup> alloy content.

## Girdler Says Back Pay Not Problem

EXPENSE of rehiring and paying back wages to some employees as a result of the Supreme Court's recent upholding of a Labor Board order in connection with the 1937 strike "will not involve any serious financial problem" to Republic Steel Corp., Tom M. Girdler told stockholders at the annual meeting last week in Jersey City, N. J.

This expense, the Republic chairman said, will, in the opinion of the management, have been "more than compensated for by the high degree of efficiency of operations which has prevailed under the employee relationships which the company has enjoyed during the past several years."

At the same time Mr. Girdler declared the Supreme Court decision will have no effect on Republic's \$7,500,000 suit now pending against the CIO, the SWOC and their officers and lodges for violation of the Federal anti-trust laws. "In this suit," he said, "Republic for the first time will have the opportunity to show the lawless, ruthless and violent tactics pursued by the union, its officers and members."



## Stresses Design in Welded Construction

**D**ETROIT—Advances made in welding technique equipment, and procedure have been such that further progress in the art must be along other lines such as improved product design, according to A. E. Gibson, president of the Wellman Engineering Co., Cleveland. Mr. Gibson, a past president of the American Welding Society, addressed a joint meeting of the Detroit sections of the Association of Iron and Steel Engineers and the American Welding Society on April 9 at the Detroit Leland Hotel.

Mr. Gibson's subject was "The Effect of Design and Shop Tooling on the Cost of Welding Equipment." He declared that fabrication economies resulting from efficient tooling, jigs, fixtures and positioning machines had progressed to the point where additional, substantial savings in labor cost will have to result from other innovations.

He stressed particularly the importance of design on the future progress of welded construction. His talk was illustrated to show the progress that has been made in bending cold and hot flat steel to produce desired sections which greatly reduce welding labor. Machining of parts previous to welding is another feature of recently accepted design, he stated. This procedure requires fixtures which in many instances are simple and inexpensive, but are designed to insure proper alignment of the parts making up the completely welded structure.

The combination of bending steel and the pre-machining of parts has reduced production costs in many instances to levels unobtainable with older methods of welding flat plate and machining after completion of the weld, Mr. Gibson stated.

Manufacturers of road building equipment were cited by Mr. Gibson for the ingenuity and progress they had displayed in producing designs that could be manufactured with relatively less labor than required by previous design practice.

Education in fabrication methods is greatly needed by designers and draftsmen, according to Mr. Gibson. The designer must obtain more intimate knowledge of how work may be handled advantageously in the plant and must also learn the most economical methods of fixturing parts for welding, the speaker adding that the designer also could still learn a great

deal about the savings possible in quickly positioning work for welding. Until knowledge of this sort becomes more widespread in its application, little progress from a design standpoint can be expected.

Engineers and draftsmen should be encouraged to work closely with the production personnel and to visit the fabricating shop frequently, Mr. Gibson suggested. A welding foreman or operator can invariably point out changes in design which will result not only in reduced labor-hours but often will produce a superior product.

## Hand Electric Furnace Model Exhibited by U. S. Steel

**A** HAND-OPERATED model of a modern electric furnace is the central theme in the exhibit of United States Steel Corp. subsidiaries at the industrial show in the Commerce Department Auditorium at Washington. The show is being held in connection with the 150th anniversary celebration of the establishment of the American patent system. In connection with the patent celebration, U. S. Steel subsidiaries have prepared a booklet entitled "150 Years of Iron and Steel in the United States," which tells an interesting story about two patents in this industry—one, the patent which introduced the age of steel, and the other, the patent which influenced women's fashions in this country for more than a decade.

## Head Spinning Technique Described by Lukens

**A** COMPREHENSIVE treatise covering the technique involved in producing boiler heads, tanks, pressure vessels, etc., by spinning steel plate, has been prepared by Lukens Steel Co., Coatesville, Pa., as a reference source for designers and fabricators. All information essential in calculating prices for forming spun heads is included.

The 132-page book is prefaced by a brief history of machine spinning, followed by a section describing the equipment and methods employed in forming flanged only heads, standard flanged and dished heads, elliptical dished heads, and various other types, including code designs. Photographs generously illustrate the text.

For each diameter and gage of product listed, the radius of the dish, standard straight flange, inside corner radius, recommended straight flange, approximate inside depth of dish,

blank diameter and list price per head is given. Other sections cover such Lukens' products as flue holes, manholes, manhole saddles, fittings, etc.

## Story of Color Oxides Told in Booklet

**T**HE story of the development of color oxides for porcelain enameling work, how the oxides are made and how best to handle and apply them, is told in an unusual booklet published by Chicago Vitreous Enamel Product Co., Cicero, Ill.

The booklet contains 115 color chips, grouped as to classification, color combinations and color comparisons and shows, in color, how basic oxides can be blended. In explaining the blending basic oxides, color chips are used to show the result of blending various percentages of the base colors. The percentage proportions required to obtain the various blends are also given. The booklet avoids technical terminology, employing simple language to describe the procedures.

## U. S. Steel Releases New Steel Making Film

**A** NEW film, entitled "The Making and Shaping of Steel," which tells the story of steel from the time the ore is mined until the finished product leaves the mills, has just been released by United States Steel Corp. Available either in 16 or 35 mm. size, this new sound picture is offered in seven reels. Other pictures being distributed by the corporation include a four reel 16 mm. film describing construction of the San Francisco-Oakland Bay bridge, a two reel 16 mm. production showing uses of corrosion-resistant, high-tensile steels, and the four reel technicolor picture, "Steel—Man's Servant."

Technical societies, colleges, schools, civic and business organizations may obtain any of these films free by applying to the nearest of the following newly established distribution centers: C. R. Moffat, U. S. Steel Corp. of Delaware, 436 Seventh Avenue, Pittsburgh; A. C. Wilby, U. S. Steel Corp. of Delaware, 208 South LaSalle Street, Chicago; George J. Dorman, U. S. Steel Corp., 71 Broadway, New York; LeRoy Holt, Tennessee Coal, Iron & Railroad Co., Brown-Marx Building, Birmingham; W. H. Cordes, American Steel & Wire Co., Rockefeller Building, Cleveland, and J. B. DuPrau, Columbia Steel Co., Russ Building, San Francisco.

# Iron Ore Shortage Seen Forcing Germany to Seize Norway, Sweden

GERMANY'S invasion of Norway was forced, in part, by the Reich's growing deficiency in iron ore, industrial observers in the United States believe. Such a belief suggests that Herr Hitler must now invade Sweden.

While the desire of Germany's military machine to get within easy bombing distance of British industrial centers, the possible need by the Nazi party of another territory expansion for political reasons and many other factors are vitally important, the principal reason for the move into Scandinavia may be a shortage of iron ore. Latest available figures show that the Reich's production of iron from domestic ores has been running about 25 per cent of the total produced in that country, with the Government striving to increase the percentage. Germany's steel plants consume about 25 per cent domestic scrap.

Organization of the government-financed Hermann Goering A. G. to exploit deposits of low grade siliceous iron ores at Salzgitte in central Germany was intended to lessen dependence on French ore imports, stopped by the war, and on the still more important Kiruna and Gellivara groups of mines in Sweden.

## Iron Content Low

Until recently the Siegerland district has been the Reich's largest producer of ore, the veins of siderite ore three to 30 ft. wide containing 35 per cent iron. Reserves in this area are estimated at 10,000,000 tons. During the last few years the output of the Peine-Salzgitte district has been greater than that of Siegerland, although the iron content of this high-phosphorus ore is only 30 per cent, compared with the 32 per cent average yield of all German ore and with the Swedish ore iron yield of 56 to 71 per cent.

Doubt that the Goering company can improve the country's iron ore position through attempts to exploit the lean domestic ores and thus free the Reich from dependence on foreign supplies has been expressed both in Germany and in the United States.

The possibility that efforts to make the Reich steel industry more self-sufficient in raw materials are increasingly unsuccessful may have weighed heavily in Herr Hitler's decision to strike at

Scandinavia in an attempt to give Germany permanent possession of Sweden's rich ore deposits. Before the World War Germany's heavy industries were based on control of the Lorraine minette iron ore deposits in France, which provided nine-tenths of Germany's needs.

As recently as 1938 Germany im-

## Steel Prices Were Weak a Year After Outbreak of War in 1914

THOSE who have been expecting that the war in Europe and the consequent expansion of iron and steel export trade of the United States would impart strength to prices of steel and other commodities have been checking back into 1914-15-16 records to find out just what happened then.

When war broke out in August, 1914, the finished steel composite price of THE IRON AGE was 1.446c. per lb. (average for the month) or \$28.92 a net ton. Over the remainder of that year and into the early part of 1915 the price trend was toward weakness. The December, 1914, composite average was 1.336c. (\$26.72 a net ton) or \$2.20 below the August level. There was a slight firming up beginning in January, 1915, but no real strength appeared in the steel market until the latter half of 1915. By December, 1915, the market had gained considerably, the average for that month having been 1.941c. per lb. (\$38.82 a ton) or \$12.10 a ton above the average price of December, 1914.

The trend was more sharply upward during 1916 and the advance continued through 1917 up to the time that prices were fixed by the War Industries Board, effective in the fourth quarter of that year.

Pig iron prices followed a similar course. The composite average price for August, 1914, was \$12.91. Not until a year later did prices gain any strength. In July, 1915, the composite average was \$12.55; in August, 1915, the average was \$1 a ton higher at \$13.55.

Bars are typical of the general course of steel prices on the major products. The Pittsburgh price was

ported slightly more than 5,000,000 tons of ore from France, compared with imports of about 9,000,000 in that year from Sweden. When war began last September, Germany's flow of ore from France was shut off and the need for getting still more ore from Sweden became critical in view of the uncertain exploitation of domestic ores.

Thus shortage of iron ore in Germany is believed to have contributed greatly to the spread of Europe's latest war.

1.20c. a lb. at the end of August, 1914, and this price continued into September, but turned weaker until at the end of the year bars were being sold at 1c. a lb. By the end of 1915 the price averaged 1.84c. (for December) and by the end of the following year (also the December average) was up to 3c. a lb.

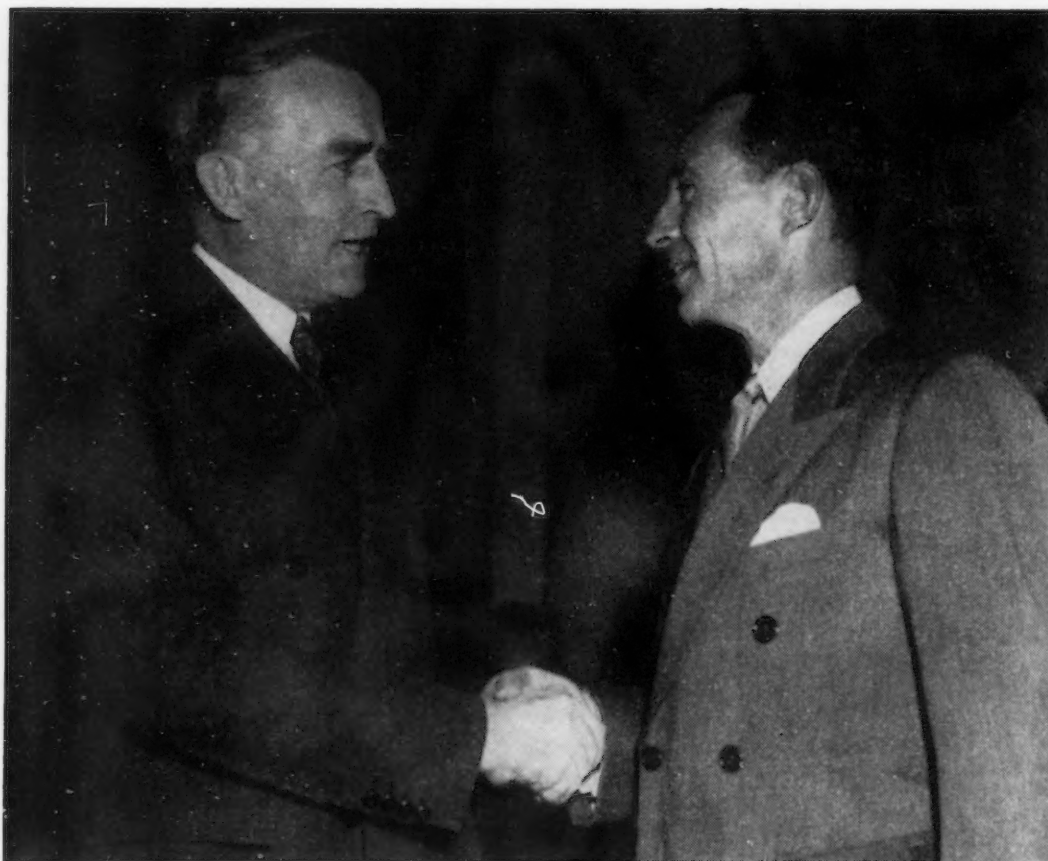
## U. S. Steel Adding New Tin Mill Units

PITTSBURGH—U. S. Steel Corp.'s program for rounding out its cold reduced tin plate facilities in line with the rapid increase in consumption of cold reduced tin plate during the past few years, is now to be carried out. Increased facilities on which work will go ahead (IRON AGE, Oct. 12, 1939, issue, page 89) will include a new five-stand tandem 42-in. cold reduction mill, a temper pass mill, two shearing lines, and two cleaning lines at Carnegie-Illinois Steel Corp.'s Irvin works.

An additional temper pass mill is slated for the company's Gary works, as well as additional accessory equipment. Substantially the same rounding out program as at Gary will be carried out at Tennessee Coal, Iron & Railroad Co.'s plant, where increased temper pass mill and tinning capacity, as well as additional auxiliary equipment, will be installed.

These changes at the corporation's tin plate plants will not add to total tin plate capacity but rather will supplant abandoned hot packed tin plate capacity and carry through a program of modernization started in 1936.

# Unemployment Is "The Real Threat" to



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**T**WO key figures in efforts to find a solution to the age-old problem of unemployment meet during the Temporary National Economic Committee hearings at Washington. Senator Joseph C. O'Mahoney, left, is chairman of the TNEC. At the right is Edsel Ford, son of the man who has won a unique position in industrial history as a pioneer in mass production.

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**EDITORIAL NOTE**—No information published about industry in American magazines and newspapers in recent years received more attention than six articles on "The Threat to the Machine," written by J. H. Van Deventer, editor and publisher of *THE IRON AGE*, and printed in this publication last year.

In exposing efforts to control technological progress by law and thus deal a serious blow to the American system of private enterprise, *THE IRON AGE* unintentionally misinterpreted the attitude of Senator Joseph C. O'Mahoney, chairman of the Temporary National Economic Committee. Senator O'Mahoney here explains his views.

By SENATOR JOSEPH C. O'MAHONEY

**D**EBATE, disagreement and even denunciation do not offend me, particularly when they are based upon a correct understanding of facts, because they constitute the very essence of the democratic system. Sometimes misunderstanding itself is helpful if it opens the door to understanding. It may be, therefore, that *THE IRON AGE* has done me a service by what I know was an unin-

tentional misquotation in its stimulating pamphlet, "The Threat to the Machine," a misquotation which has given me this opportunity to explain to the readers of *THE IRON AGE* that I conceive myself to be a friend rather than a foe of every form of technological advance.

The statement credited to me in this significant publication was: "Science and invention are to blame for the present unemployment in America." I not only never said that, but I never thought it though I completely exonerate *THE IRON AGE* for the use of the sentence since I understand it was taken from a newspaper account of a speech I made a year or so ago to the Wholesale Grocers. The language, however, should not be charged to me, but to a misunderstanding upon the part of the person who attempted to quote me.

On more than one occasion during the past 10 years I have said that science and invention have changed the face of the earth and that sometimes they have utterly altered the institutions of man just as the invention of gunpowder and the gun was one of the most effective factors in putting an end to the feudal system.

That science and invention have immeasurably raised the standard of living, that they are constantly creating



# Machine, Senator O'Mahoney Writes

new industries and thereby new jobs, and that they hold out to mankind the greatest hope for the future, I am ready to assert as vigorously and as often as any inventor or user of machines desires. My only contention is that these undeniable statements do not tell the whole story because they do not reflect the effect of labor-displacing machines upon the particular men who are displaced. The only significant discussion involved in technology is the extent to which and the means by which the men who are displaced are later absorbed in other activities.

It seems to me to be a matter of great importance to all of us who want to promote the use of technology to realize that unemployment is one of the greatest obstacles to the advance of technology because it destroys the market which technology needs. Unemployment is the real threat to the machine and not anything that may be mistakenly said about the machine.

It is my contention that only commerce and industry can solve unemployment. It is my belief that only private industry can pay the wages which must be paid to create the market which farm and factory must have if a stable prosperity is to be established.

## Man Must Produce

MAN lives by work, whether by the hands or by the brain. The more physical labor he can escape, the greater his opportunity for mental development, but man can work only by producing and he must produce for himself.

Industry cannot safely permit government to assume the task of solving the unemployment problem because if it does it will drive government into production and when government enters the field of production it enters the field of private business. When that happens the system of free enterprise is under attack. It was largely because in Russia, Germany and Italy the unemployment problem was abandoned to government that those countries have become totalitarian states.

A few weeks ago I introduced in the Senate, "for the purpose of study and discussion" a bill which I said at that time was "intended to enable industry itself to provide work for the millions who are now without it." The bill was misdescribed as intended to tax machines. Actually it was nothing of the sort. Its primary purpose was to reward the employers of human labor by providing for them a tax credit to be measured by the amount of wages paid. This was offered on the theory that it is of such extreme importance to society to end the unemployment problem that a special reward should be extended to those who, whether by the creation of new industries or by the invention of new machines or the expansion of present industries, give jobs to the people who need them.

It is true that the bill also provided for a contribution or a tax to be paid by industry, the theory being that it is better to pay as you go than to permit the government to continue to borrow and thus pile up an obligation in the form of a huge national debt which must eventually be

paid out of future production unless it is to be repudiated.

This is the provision which was incorrectly described as a tax on machines. It was not to be measured by either the number or the kind of machines used, but by earnings; and I know of no better basis for any tax better than earnings. It is only by such a tax that we can ever begin to think of balanced budgets. The earnings upon which this proposed tax would be levied would be as likely to arise from manipulation of prices as from anything else.

Such a tax might be substituted for the present payroll tax which is certainly not a stimulus to employment, but, in any event, it could easily be so drafted, I am sure, as to make certain that it would not in any event act as a deterrent to the use of any technological device.

## Discussion With Ford

THE whole story was told in a brief exchange between Mr. Edsel Ford, president of Ford Motor Co., and myself at a hearing of the Temporary National Economic Committee on April 10 last. May I quote from the exchange:

"CHAIRMAN O'MAHONEY—I gather from your testimony, which has been most interesting, two simple facts, and I am going to ask you whether they correctly represent the picture that you have of this problem. The first is this, that without the modern machine and technological improvement it would be utterly impossible for an organization like the Ford Motor Co. to supply cars on so large a scale to so many people.

"FORD—That is absolutely correct.

"O'MAHONEY—And the second is that it would be impossible for the Ford Motor Co. to use the machines which have this beneficial effect without a large-scale purchasing power upon the part of potential customers.

"FORD—Yes.

"O'MAHONEY—And the conclusion to be drawn from that is that the measure of technological advance is the capacity of the masses to buy the products of technology.

"FORD—Absolutely correct.

"O'MAHONEY—You agree with all this?

"FORD—I agree with that decidedly."

The point of it all is that the continued advance of technology, the preservation of the democratic principle and the survival of the capitalistic system demand that we find the formula by which commerce and industry shall provide for the immediate absorption of those who are displaced. It may well be that the formula I have offered is not the right one, but let us get the right one rather than close our eyes to the problem by hoping that things will somehow work themselves out.

The advance of technology was not achieved by waiting for something to turn up. The unemployment problem will not be solved that way, either.

# ... THE NEWS IN BRIEF ...

Price cuts on flat rolled products unexpected in Detroit.—Page 53.

Automobile production gains slightly as a result of large March sales.—Page 58.

Ralph A. Powers, of Electronic Control Corp., addresses April 11 meeting of Detroit tool engineers.—Page 61.

Richard K. LeBlond, president, LeBlond Machine Tool Co., purchases abandoned Remington-Rand plant.—Page 61.

Stewart Motor Corp. starts production.—Page 61.

Republic Steel Corp.'s first quarter earnings \$3,111,723 compared \$6,772,692 in the fourth quarter of 1940.—Page 61.

Charles R. Hook and Ford show TNEC how technological progress has created jobs, reduced prices, lifted American standard of living to record height. Philip Murray, SWOC leader, claims continuous mill displaces thousands of workers.—Page 62.

Brazil sets up "national steel plan commission" to organize new industry.—Page 76.

New iron ore deposits are discovered in Bihar province, India.—Page 77.

Senate Appropriations Committee reports favorably the billion dollar naval bill.—Page 77.

President Roosevelt extends area forbidden to U. S. ships to Scandinavian waters.—Page 78.

Allies obtain right to purchase three latest U. S. warplanes.—Page 79.

Cuba's imports of iron and steel products in first two months of 1940 double volume in like period last year.—Page 79.

Duraluminum coaches weighing 33 tons are reported given successful trial runs in Italy.—Page 80.

Wagner Act amendments approved by Norton committee are criticized in minority report.—Page 80.

Wright Aeronautical Corp. buys another plant at Fairlawn, N. J., as business gains.—Page 80.

Carnegie-Illinois Steel Corp. to build new blast furnace at Rankin, Pa.—Page 80.

Austin Co. will erect two new buildings for Sterling Foundry, Wellington, Ohio.—Page 80.

Government contracts for iron and steel products in week ended April 6 total \$993,447.—Page 81.

House passes bill calling for \$100,000 study of productivity and labor costs in industry by Labor Department.—Page 81.

American Steel Warehouse Association chapters elect officers; 31st convention to be held May 21-22 in New York.—Page 81A.

American Society for Metals, Detroit chapter, hears Dr. A. B. Kinzel, Union Carbide & Carbon metallurgist, lecture on "Effects of Alloying Elements in Steel."—Page 81A.

Henry Booth is elected president of International Acetylene Association; Otis C. Voss, Milwaukee, Wis., wins James Turner Morehead medal.—Page 81B.

Scrap consumption in U. S. in March declined fractionally to 2,932,000 gross tons.—Page 81C.

What hurts industry hurts the American people, Edward R. Stettinius, Jr., tells Economic Club of Chicago.—Page 81C.

Foundrymen urged to keep scrap suppliers advised of requirements by E. C. Barringer, executive secretary, Institute of Scrap Iron and Steel.—Page 81C.

"Expense of paying back wages resulting from Supreme Court's decision is not a serious financial problem," Tom M. Girdler says.—Page 81D.

Europe's steel trade largely restricted to Belgium-Luxemburg.—Page 81D.

Story of development of color oxides for porcelain enameling work is told in new booklet.—Page 81E.

U. S. Steel Corp. releases new seven-reel film on "The Making and Shaping of Steel."—Page 81E.

A. E. Gibson stresses importance of design in further progress of welded construction.—Page 81E.

Hand-operated model of electric furnace is exhibited by U. S. Steel Corp. at Washington patent system show.—Page 81E.

Boiler head spinning technique is described in Lukens Steel Co. book.—Page 81E.

Truscon Steel Co. reports first quarter loss of \$11,527.—Page 88.

Canada forms new war supply board.—Page 88.

First quarter gear sales 25 per cent above year ago.—Page 108.

U. S. Steel shipments in March decline to 57 per cent.—Page 112.

National Defense will be the keynote of the annual "Spring Round-Up" of the American Society of Mechanical Engineers, metropolitan section, on April 25.—Page 112.

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## MEETINGS

April 22 to 24—Triple mill supply convention, Dallas, Tex. Sponsors are American Supply and Machinery Manufacturers' Association, Southern Supply and Machinery Distributors' Association and National Supply and Machinery Distributors' Association.

April 26 and 27—Concrete Reinforcing Steel Institute, 16th annual meeting, Hot Springs, Va.

May 1 to 3—American Society of Mechanical Engineers, spring meeting, Worcester.

May 6 to 10—American Foundrymen's Association, annual meeting and equipment exhibition, Chicago.

May 7 and 8—Society of Automotive Engineers, national production meeting, Hartford.

May 20 to 22—American Gear Manufacturers Association, annual meeting, Asheville, N. C.

May 21 and 22—American Steel Warehouse Association, annual convention, New York.

May 23—American Iron and Steel Institute, annual meeting, New York.

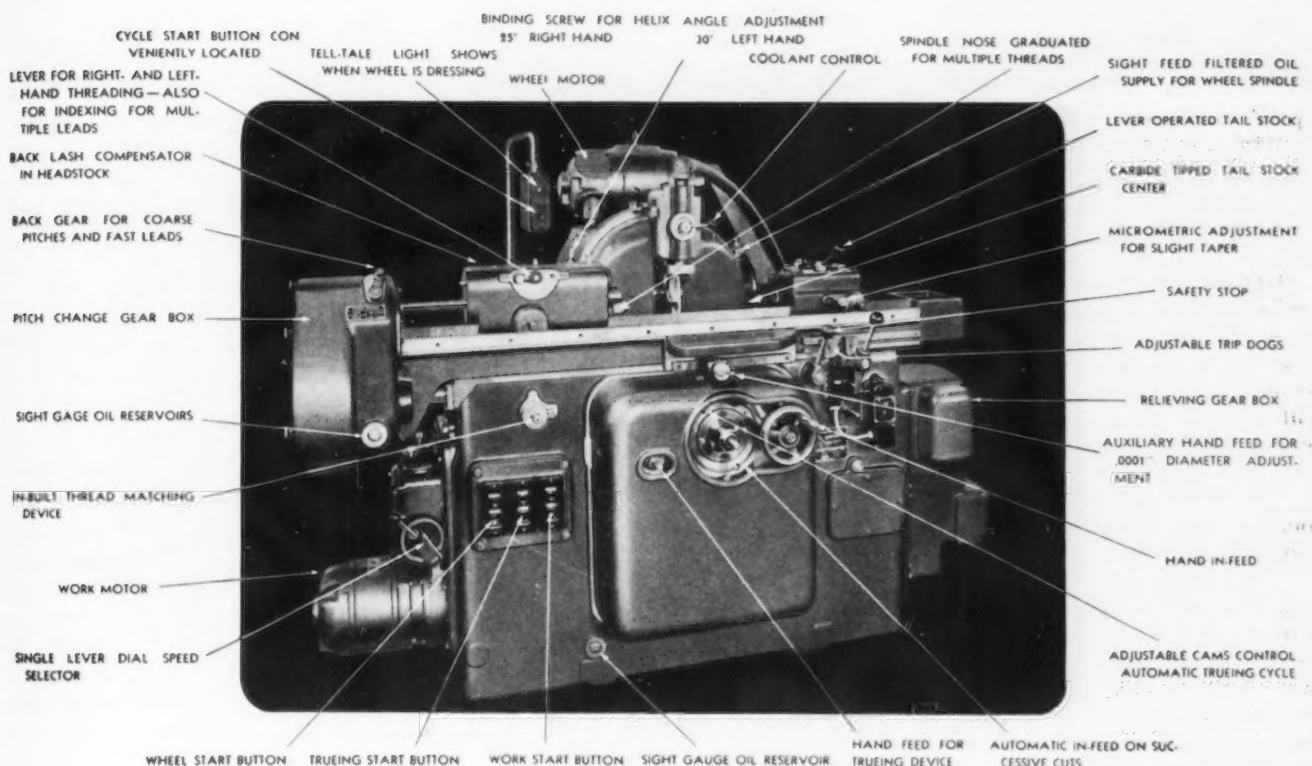
June 3 to 6—Annual international convention and Inform-a-Show, National Association of Purchasing Agents, Cincinnati.

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**DAVID C. PRINCE**, manager of the commercial engineering department of General Electric Co.



**FREDERICK R. SCHAEFER**, general manager of pressed steel operations of Republic Steel Co.



**RUSSELL M. ALLEN**, general manager of sales, Allegheny Ludlum Steel Corp.

DAVID C. PRINCE, since 1931 chief engineer of the switchgear department of the General Electric Co., Philadelphia, has been named manager of the commercial engineering department, with headquarters in Schenectady, succeeding the late vice-president E. W. Allen. Mr. Prince has also been named a member of the company's advisory committee and the apparatus sales committee. He will have general direction of all sales department and district engineers and the contract service department. He is the holder of over 70 patents and was one of eight GE engineers recently selected as "Modern Pioneers of Industry." He entered the testing department of the company in 1913 after his graduation in engineering from the University of Illinois.

♦ ♦ ♦

FREDERICK R. SCHAEFER, who has been general manager of the Niles Steel Products division of Republic Steel Corp., has been placed in charge of pressed steel operations of the company and its subsidiaries. He will have jurisdiction over the Niles and Superior divisions, and will also serve as general manager of the Pressed Steel division of Truscon Steel Co.

A graduate of the University of Michigan and of the Lewis Institute of Technology, he was sales manager of the Hydraulic Pressed Steel Co. from 1922 to 1929, when it became part of Truscon Steel. At that time he joined the Niles Steel Products Co., of

which he became vice-president and general manager in 1935. He was formerly New York district sales manager for the Taylor-Wharton Iron & Steel Co. and manager of sales for the Savage Arms Corp.

♦ ♦ ♦

RUSSELL M. ALLEN has been appointed general manager of sales, Allegheny Ludlum Steel Corp., Pittsburgh. Mr. Allen joined the Allegheny Steel Co. as a laborer at the close of the war and was made a clerk in the Pittsburgh sales department in 1921. In the following year he was transferred to the Detroit district sales office where he remained until October, 1925. He then was transferred to the Chicago office as district manager of the Western territory and in April, 1934, returned to Pittsburgh as assistant general sales manager for Allegheny Steel.

Following the merger of Allegheny Steel Co. and Ludlum Steel Co., Mr. Allen was made assistant to the president of Allegheny Ludlum Steel Corp., which position he held until his new appointment.

♦ ♦ ♦

HENRY J. FISCHBECK, for the past 10 years chief metallurgist for the Pratt & Whitney Aircraft division of United Aircraft Corp., East Hartford, Conn., has been promoted to the post of process engineer. He will keep in close contact with all manufacturing and engineering departments and will

## PERSONNEL

have control of processes involved in the manufacture of aircraft engines. Mr. Fischbeck has had a wide experience in the applications of metallurgy to aircraft, having been identified with the Simplex Automobile Co. which made Hispano-Suiza aircraft engines during the World War, with the Wright-Martin Co., the Wright Aeronautical Corp. and the Pratt & Whitney Tool Co. He joined Pratt & Whitney Aircraft in 1929 to organize the metallurgical and heat treating department.

♦ ♦ ♦

HARRY N. HAYES, who has been identified with the Coffing Hoist Co., Danville, Ill., for a number of years, as a district sales manager for the company in various territories, has been appointed general sales manager.

♦ ♦ ♦

JOHN J. CROWE, formerly manager of the apparatus research and development department, Air Reduction Co., New York, has been appointed assistant to HERMAN VAN FLEET, vice-president and operating manager. He will direct the activities of the apparatus research and development department and will coordinate these activities with similar activities for the



**HENRY J. FISCHBECK**, process engineer, Pratt & Whitney Aircraft.



**HARRY N. HAYES**, general sales manager of Coffing Hoist Co.



**JOHN J. CROWE**, assistant to vice-president and operating manager of Air Reduction Co.

## PERSONALS . . .

Wilson Welder & Metals Co., Inc., a subsidiary of the Air Reduction Co. In addition, he will handle apparatus patent matters for Mr. Van Fleet.

H. E. LANDIS, JR., formerly assistant to Mr. Crowe, has been appointed manager of the apparatus research and development department. In another Airco change, C. G. ANDREW has been appointed manager of gas plants.

♦ ♦ ♦

COL. H. W. ALDEN, an original incorporator of Timken Detroit Axle Co. and chairman of the board since 1922, has resigned as chairman but will continue as a director in charge of engineering. WILLARD F. ROCKWELL has been elected to succeed him as chairman. WALTER F. ROCKWELL was elected president and S. W. WARNER, of Detroit, has been elected secretary. He will also fill the office of comptroller with L. C. HALTUG as assistant comptroller. RALPH H. TRESE was elected to a vice-presidency. Other officers were re-elected. All are Detroit industrialists but were elected at the annual stockholders meetings, April 9, at Canton, Ohio.

♦ ♦ ♦

L. A. SCHMIDT, vice-president and chief engineer, National Tool Co.,

Cleveland, and J. VICTOR LOEWI, of the investment firm of Loewi & Co., Milwaukee, have been elected to the board of directors of National Tool Co.

♦ ♦ ♦

ROBERT W. GILLISPIE, president and director, Jeffrey Mfg. Co., Columbus, Ohio, has been elected a member of the board of directors of the Ohio Bell Telephone Co.

♦ ♦ ♦

I. LOUIS CARRON, known in the automobile industry as former body engineer for Chrysler Corp., and former member of the governing board of the Detroit section, Society of Automotive Engineers, is now sales manager and engineer for Prestole Devices, Inc., division of Detroit Harvester Co. J. POLLAR has been named to succeed Mr. Carron as body engineer at Chrysler.

♦ ♦ ♦

HARRY WOODHEAD, for 13 years general manager of the Cleveland plant of Truscon Steel Co., has been elected president of Aviation Mfg. Corp., subsidiary of Aviation Corp., New York. Mr. Woodhead, who will assume his new duties immediately, succeeds W. H. BEAL, who resigned because of ill health. Mr. Woodhead's career includes service as vice-president of Federal Pressed Steel Co., Milwaukee; general works manager of A. O. Smith Co., Milwaukee; former vice-president of the Midland Steel Products Co. of Cleveland and Detroit, and superinten-

dent of the Canadian plant of Perfection Stove Co., at Sarnia, Ont.

♦ ♦ ♦

E. E. REAGLE, formerly operations director, has been named assistant to the vice-president of Sharon Steel Corp., Sharon, Pa.

WALTER JACKSON has been elevated to manager of the Sharon works and LLOYD WILSON is assistant manager. W. W. SCHOFIELD has been appointed manager of the Lowellville works. For several years Mr. Schofield has been superintendent of the steel works and blast furnace at Lowellville.

GEORGE S. WARREN, chief engineer at the Sharon plant, has resigned after 35 years of service. No successor has been named.

♦ ♦ ♦

EDWIN T. ASPLUNDH has been elected vice-president and general manager of Columbia Chemical division of Pittsburgh Plate Glass Co., at Barberton, Ohio. He succeeds HUGH A. GALT, who has retired after more than 40 years with the company.

♦ ♦ ♦

DR. H. S. ARTHUR, McKeesport, Pa., has been elected president of Massillon Steel Casting Co. A physician, school board director, and former Mayor of McKeesport, Dr. Arthur, who succeeds the late Arthur H. Anthony, has been vice-president of the company since last August, and has been a director since its organization

in 1917. Plant operations will be in charge of FRANK HUMBERGER, former secretary-treasurer, who has been elected vice-president and treasurer, and MINDRED EMORY, works manager, who has been elected assistant treasurer. GLENN WILT, sales manager, has been chosen secretary and a director.

♦ ♦ ♦

ROLAND WHITEHURST, for the past 20 years manager of the Washington branch office of the Electric Storage Battery Co., Philadelphia, has been made assistant general sales manager of the company. J. A. KLINGENSMITH, who has been a member of the sales staff of the Washington office, will succeed Mr. Whitehurst as manager of that office. Mr. Whitehurst has been identified with the company since 1908.

♦ ♦ ♦

HENRY BOOTH, vice-president of the Shawinigan Products Corp., New York, was elected president of the International Acetylene Association at the 40th annual convention in Milwaukee, last week. E. L. MILLS, vice-president of the Bastian-Blessing Co., Chicago, was elected vice-president, and PHILIP KEARNEY, founder and president of the K-G Welding & Cutting Co., New York, is the new treasurer. H. F. REINHARD, of the Union Carbide Co., New York, was reelected secretary of the association.

♦ ♦ ♦

THOMAS E. COCKER, who has been identified with the Chain Belt Co., Milwaukee, since 1921, has been appointed manager of the Detroit office of the company, succeeding G. A. GUNTHER. Mr. Cocker has served also as district manager of both the Cleveland and Buffalo offices. Mr. KLEMME, with the engineering and sales department since 1935, succeeds Mr. Cocker as manager of the Buffalo district office. ROBERT POTTER, a member of the home office sales staff, has been transferred to the Pittsburgh office to assist GAYLE SHERRATT, district manager.

♦ ♦ ♦

E. F. MEYER, heretofore identified with the St. Louis district office of the Cutler-Hammer, Inc., Milwaukee, has been placed in charge of the company's Houston, Tex., territory, with headquarters in that city. A graduate of the University of Wisconsin with a B.S. degree in electrical engineering, Mr. Meyer joined Cutler-Hammer shortly after leaving school, starting in the experimental and testing departments.

W. J. HARRADINE has been elected a director and vice-president and general manager of the recently reorganized Keystone Driller Co., Beaver Falls, Pa. Mr. Harradine was previously associated with this company in an executive position but prior to his present appointment was connected with the Buckeye Traction Ditcher Co. in charge of the Washington office.

♦ ♦ ♦

WILLIAM B. DOBSON has been appointed works manager of the Oil City Tank & Boiler Co., Oil City, Pa. For

engaged in development activities on all applications of both ferrous and nonferrous nickel-containing alloys. DR. WILLIAM A. MUDGE, formerly works metallurgist of the company's Huntington, W. Va., rolling mill, and who recently joined the technical service section of the development and research division in New York, has been appointed assistant director of technical service.

♦ ♦ ♦

C. J. OXFORD, chief engineer, National Twist Drill & Tool Co., and



**ROLAND WHITEHURST**, assistant general sales manager of the Electric Storage Battery Co.



**HENRY BOOTH**, president of International Acetylene Association.

many years he was superintendent of the heating boiler division of the Struthers-Wells Titusville Corp. Prior to this he was associated with the Petroleum Iron Works Co., Sharon, Pa., in a similar capacity.

♦ ♦ ♦

FERRIS M. ANGEVIN, secretary, Cincinnati Milling Machine Co., Cincinnati, has been elected as an additional member of the board of directors.

♦ ♦ ♦

ELMER A. TRASK has been appointed manager of the San Francisco office of John A. Roebling's Sons Co. of California.

♦ ♦ ♦

F. L. LAQUE, who has been assistant director of technical service on mill products in New York for International Nickel Co., New York, is now

LESTER DETTERBECK, Banner Mfg. Co., were speakers on the program for the lecture and dinner meeting of the Racine (Wis.) chapter, American Society of Tool Engineers. Mr. Oxford spoke on "Modern Metal Cutting," while Mr. Detterbeck discussed "Cam Design."

♦ ♦ ♦

L. T. ROSENBERG, electrical engineer at Allis-Chalmers Mfg. Co., Milwaukee, addressed a recent dinner meeting of the Chicago section of the Association of Iron and Steel Engineers.

♦ ♦ ♦

FRED H. DORNER, consulting engineer of Milwaukee, has been named general chairman of the summer meeting of the American Society of Mechanical Engineers to be held at the Pfister Hotel, Milwaukee, June 17 to



20, at which 1000 visitors are expected. HANS DAHLSTRAND, of the Allis-Chalmers engineering department, and WILLIAM D. BLISS, president of Bliss Brothers Tool Co., have been appointed vice-chairmen. BRUNO E. V. NORDBERG, executive engineer, Nordberg Mfg. Co., will be honorary chairman.

♦ ♦ ♦

CLARENCE B. RANDALL, vice-president of the Inland Steel Co., Chicago, was one of the speakers at the fiftieth anniversary celebration meeting of the

tendent of shops for the Burlington railroad, Aurora, Ill., succeeding J. W. CYR, who has retired after 57 years of service. E. J. CYR was appointed master mechanic of the Chicago-Aurora-LaCrosse division, to succeed Mr. Gugler. F. J. BYINGTON has been appointed general manager of the eastern district of the Chicago & North Western railway with headquarters in Chicago. Mr. Byington was formerly general superintendent. W. A. KRAEMER, former assistant general superintendent, has been appointed assistant

now vice-president in charge of engineering and research. GEORGE S. SALZMAN, works manager, becomes vice-president in charge of manufacturing. L. W. CHRISTENSEN, R. E. MOONEY and DREW McKENNA have been made assistant sales managers. L. W. KRUMM is now planning manager.

♦ ♦ ♦

F. A. OLMSTEAD, formerly vice-president of Hodell Chain Co., Cleveland, has joined the Cleveland office of Youngstown Sheet & Tube Co., in a sales capacity. SAM F. COLE, of the Cleveland office, is now resident salesman at Columbus for Sheet & Tube, replacing C. O. NASH, who has been transferred to the Pittsburgh offices.



**T**HOMAS E. COCKER, manager of the Detroit office of Chain Belt Co.



**E. F. MEYER**, manager of the Houston, Tex., district office of Cutler-Hammer, Inc.

Milwaukee alumni of the University of Chicago at the Milwaukee City club. Randall is one of the trustees of the university and an executive committee member of the fiftieth anniversary celebration.

♦ ♦ ♦

ARCHIE CHANDLER has been elected vice-president in charge of sales of the American Pulley Co., Philadelphia. He first became associated with American Pulley in 1915 as district sales manager in charge of the Pacific Coast territory. In 1928 he was named general sales manager of the company.

♦ ♦ ♦

C. L. WHIPPLE has been appointed assistant vice-president in charge of operations for the Union Pacific railroad, a newly created position. Mr. Whipple was formerly general superintendent of transportation. H. C. GUGLER has been appointed superin-

general manager of the eastern district.

♦ ♦ ♦

W. E. BORBONUS, heretofore treasurer of the R-S Products Corp., Philadelphia, has been elected president, succeeding F. J. RYAN. D. E. WYMAN, formerly chief engineer of the industrial furnace division of the Philadelphia Drying Machinery Co., has been made vice-president and chief engineer of the R-S Products Corp.

♦ ♦ ♦

J. J. McINTYRE, vice-president and general manager of the Cleveland Graphite Bronze Co., Cleveland, has been appointed senior vice-president. JAMES L. MYERS, secretary and treasurer, is executive vice-president; CARL W. JOHNSON, director of sales, is now vice-president in charge of sales; JOHN V. O. PALM, chief engineer, is

## British Imports Rise While Exports Fall

**L**ONDON—The total value of iron ore and scrap imported by the United Kingdom in February, according to Board of Trade statistics, was £977,892, an increase of £494,559 over the value of such imports in the corresponding month of 1939. Imports of iron and steel and manufactures thereof in February were valued at £1,926,835, a rise of £950,403 over February, 1939. Machinery imports were valued at £2,385,657, a rise of £638,144. Vehicles, including locomotives, ships and aircraft, were imported to the value of £407,468, which was £65,232 below the figure for the previous February.

The value of iron and steel and manufactures thereof exported in February reached £2,424,725, which was £370,054 less than in 1939. Machinery exports were valued at only £3,385,281, a drop of £1,135,673. Vehicles exported were valued at £2,304,441, a decline of £2,888,902.

## Tarrier Steel Co. to Build Plant Addition

**C**OLUMBUS, OHIO—The Tarrier Steel Co., 762 Hanford Street, Columbus, manufacturer of steel products, I-beams and ornamental iron fence and railing, is engaged in the construction of a new addition to its plant, it was announced by Fred A. Tarrier, president of the company.

## Truscon Reports \$11,527 Loss

**T**RUSCON STEEL CO., subsidiary of Republic Steel Corp., reported a net loss for the first quarter of 1940 of \$11,527 after deduction for repairs and maintenance expense and provision for depreciation.

## Inland Reports on Lead Bearing Steels

**PITTSBURGH**—Research at Inland Steel Co. has shown that lead is not given off by solid lead bearing steels, J. W. Halley, metallurgist, Inland Steel Co., told safety engineers and industrialists at a regional conference and exposition of the Western Pennsylvania Safety Council held here last week.

Discoursing on a subject that has held considerable interest recently, Mr. Halley said, "The lead is locked within the steel and cannot be released unless the structure of the steel is destroyed by melting or by turning the steel to an oxide. The amount of lead released during various operations, such as welding, flame cutting and scaling, in which a portion of the steel is melted or oxidized, has been determined. At temperatures below 1700 deg. F. it was found that the rate of lead release

by the formation of scale was extremely low, less than 0.005 mg. of lead per sq. in. of surface per min. Consequently there is very little possibility of developing a health hazard at temperatures below 1700 deg. F. At higher temperatures a measurable amount of lead is released."

Commenting on a detailed study made by Inland from a safety standpoint, Mr. Halley added: "By using the values found for the rate of lead release during various operations the possibility of developing a health hazard under any given conditions can be determined. The highest rate of lead release occurs during oxygen cutting and the rate of lead release should be calculated for any case in which this operation is carried on a production basis. Welding releases lead at a much slower rate than does oxygen cutting. Operations carried on at low temperatures, such as machining and forming, do not release a measurable amount of lead."

## Canada Forms New War Supply Board

**OTTAWA, ONT.**—The Department of Munitions and Supply, which has been organized to replace the former War Supply Board, will be headed by Hon. S. D. Howe with George Kingsley Sheils deputy minister. W. R. Campbell, chairman of the War Supply Board, has resigned and will return to his former duties as president of Ford Motor Co. of Canada, Ltd., Windsor, Ont. Mr. Campbell headed the War Supply Board, during the difficult organization period and was responsible for the placing of contracts in excess of \$150,000,000 in war supplies for the Canadian Government. W. C. Woodward, of Vancouver, has announced his intention to remain on the new board, and it is understood that other members also will hold their positions.

James S. Duncan, vice-president and general manager of Massey-Harris Co., Toronto, has been named associate acting Deputy Minister of National Defense by the Canadian Government, and will be in charge of aviation.

### Machine Tools in Demand

The large flow of war contracts placed in recent weeks for guns, munitions, ships, aircraft, etc., as well as general plant expansion, has resulted in extensive purchases of machinery and tools, with Canadian tool and equipment builders running at capacity to fill orders. There have also been large imports from the United States. The Canadian Pacific Railway soon will be in the market for tools totaling approximately \$250,000 for its various shops. The Canadian National Railways also is understood to be in the market for equipment valued at about \$50,000.

### New Metal Nipple Standards

**WASHINGTON**—Because the Bureau of Standards has received a satisfactory majority of acceptances, its proposed commercial standards for steel, wrought iron, copper and brass pipe nipples will be made effective on May 10 in accordance with the voluntary procedure sponsored by the Bureau's Division of Trade Standards. The bureau circularized manufacturers, distributors and users last January on a recommended revision and consolidation of the three commercial standards proposed by the National Association of Pipe Nipple Manufacturers.

## ... OBITUARY ...

**N. A. STRAND**, a member of the firm of N. A. Strand & Co., Chicago, died at his home in Evanston, Ill., after a long illness on April 10. He had not been actively engaged in business for several years because of poor health.

♦ ♦ ♦

**WILLIAM G. WETHERALL**, for 52 years president of the Baltimore company of the same name, died in the Union Memorial Hospital in that city last week. He was 82 years old. In 1875 he entered the steel jobbing firm which his father had founded in 1847. In 1880 he was admitted to partnership and eight years later assumed charge.

♦ ♦ ♦

**W. R. ADAMS**, president of the J. D. Adams Mfg. Co., Indianapolis, died in Los Angeles on April 5 while on vacation. He had been identified with the company since his graduation from Purdue University in 1910 and had been made president in March, 1938.

♦ ♦ ♦

**FREDERICK W. PETERS**, 63, Cleveland inventor and founder in 1905 of the old Peters Machine & Mfg. Co., now Cleveland Steel Products Corp., died April 11. At his death he was head of the Peters Machine Co., organized a year ago.

♦ ♦ ♦

**ARTHUR MILTON JOHNSTON**, for the last 15 years Milwaukee district man-

ager for the Greenfield Tap & Die Corp., died at his home in Wauwatosa, Wis., April 11 after a brief illness at the age of 39 years. He was a native of England and came to this country 20 years ago. He belonged to the Milwaukee chapter of the American Society of Tool Engineers.

♦ ♦ ♦

**WILLIAM HALLIE MEYST**, 60, since 1900 direct mill representative for the Otis Steel Co., Chicago, died in Chicago unexpectedly April 11.

♦ ♦ ♦

**ADDA G. KARCHER**, 51, assistant production supervisor, American Brass Co., at Kenosha, Wis., died at his home in that city April 9 following an extended illness. He had been associated with the company since 1906, having been made assistant production supervisor in 1939.

♦ ♦ ♦

**JOSEPH C. HAIMERL**, 59, former head of the Baraboo (Wis.) Gray Iron & Aluminum Foundry, died at his home in Beaver Dam, Wis., April 5 after a long illness.

♦ ♦ ♦

**JOHN R. MCGINN, JR.**, superintendent of production at the General Electric Co., West Lynn, Mass., died April 3. He was born in Haverhill, Mass., June 26, 1889, and joined the Lynn company in July, 1915, as an apprentice.

## Galvanizers Visit Ohio Valley Mills; Zinc Convention April 29

**P**ITTSBURGH—The next meeting of the Galvanizers Committee of the American Zinc Institute, Inc., will be held sometime in November at Baltimore, it was decided here last week at the committee's seventh meeting.

Inspection trips to Wheeling Steel Corp.'s and Weirton Steel Co.'s plants featured the gathering, and technical discussions on galvanizing practices and research were also held.

F. R. Morral, research metallurgist, Continental Steel Corp., presented two papers, "X-Ray and Electron Diffraction Methods for Metallurgical Research," and "A Study of Tarnish on Galvanized Sheets by an Electron Diffraction Examination."

In summarizing his talk, Mr. Morral noted that the transparent zinc oxide coating found on freshly hot galvanized sheets in the absence of carbon dioxide but in the presence of moisture, grows until it becomes visible as a yellow brown tarnish. In the proper amount of humidity and an excess of carbon dioxide, this zinc oxide film is changed to basic zinc carbonate, often called "white rust." In the presence of humidity and a deficiency of carbon dioxide, a blue cast tarnish is formed by the zinc oxide film which consists of varying amounts of zinc oxide and basic zinc carbonate. The speaker also pointed out that the zinc oxide film on freshly galvanized sheets is as protective against atmospheric corrosion as a zinc hydroxide film, because both have about the same solubility.

### Coatings no Lighter

R. W. Hodil, galvanizing superintendent, Youngstown Sheet & Tube Co., presented the committee's periodic "Third Coating Survey" which is a check on quality and practice in galvanizing operations. The speaker indicated that there is no tendency to lighten the weight of zinc coatings on ordinary roofing sheets.

Members of the Galvanizers Committee governing board who will continue to serve until the next meeting are: chairman, J. L. Schueler, Continental Steel Corp.; R. H. Dibble, Carnegie-Illinois Steel Corp.; C. K. Lytle, Tennessee Coal, Iron & Railroad Co.; D. A. Russell, Youngstown Sheet & Tube Co.; J. J. Shuman, Jones & Laughlin Steel Corp.; C. H. Steele, Steel Co. of Canada, Ltd.; F. G. White, Granite City Steel Co.; and

secretary-treasurer, E. V. Gent, American Zinc Institute, Inc.

On April 29 and 30 the American Zinc Institute is to hold its 22nd annual meeting at the Hotel Statler in St. Louis. According to the preliminary program just released a variety of topics will be discussed during the two-day meeting.

On April 29, R. S. Smethurst, assistant counsel, National Association of Manufacturers, will report upon the legislative situation in Washington. C. R. Maxon of the New Jersey Zinc Company will review the past ten years of progress in zinc alloy die castings.

On Tuesday Paul Huey of *Progressive Farmer* will speak on "Significant Changes in the Farm Market." Developments in metal farm buildings will be discussed by Stephen Mahon of the James Mfg. Co. T. W. Billings, representing Cooperative G. L. F. Farm Supplies, Inc., will talk on "Steel Distribution in the Farm Field."

Technical subjects listed for Tuesday afternoon include "Progress in Electrogalvanizing," by J. A. Singmaster, "Developments in Hot Dip Galvanizing," by J. L. Schueler, general superintendent, Continental Steel Corp., and the "Differential Density Process," by Elmer Isern, chief metallurgist, Eagle-Picher Mining & Smelting Co. The annual dinner and entertainment will be held on Monday evening and a buffet supper party on Tuesday evening will mark the closing of the convention.

## Pratt & Whitney Veterans Receive Service Emblems

**S**ERVICE emblems in the form of gold pins, some with diamonds, were presented to 154 employees of the Pratt & Whitney division, Niles-Bement-Pond Co., in the assembly hall of the company's new West Hartford plant on the evening of March 27. They were presented by Clayton R. Burt, president of the company.

It is Pratt & Whitney practice to present solid gold service pins to employees who have served 10 years or more. There are five different pins, representing respectively 10 to 20 years of service, 20 to 30 years (one diamond), 30 to 40 years (two diamonds), 40 to 50 years (three diamonds), and 50 or more years of service (one large diamond). As an employee passes from one bracket to the next, he receives a new pin. It is noteworthy that of approximately

2700 Pratt & Whitney employees, almost 1000 now wear these service record emblems.

The pins were presented after a steak dinner in the cafeteria of the new plant, and brief entertainment by the Girls Glee Club of the company. The veterans included both men and women, and the family party was attended by several company officials. In an address, Mr. Burt discussed briefly some of the problems in maintaining P. & W. activities at their present levels and outlined the way in which the new plant had borne out expectations in smoothing out materials handling and production control problems as compared with conditions at the recently abandoned Capitol Avenue factory. A technicolor picture film of the building of the new Charter Oak plant was also shown.



**JOHN VANKIERBILCK** receiving a 10 year service emblem from **C. R. Burt**, president, Pratt & Whitney division, Niles-Bement-Pond Co., as **C. M. Pond**, vice-president, looks on. On the same occasion 153 other veteran employees were similarly honored.



# Current Metal Working Activity

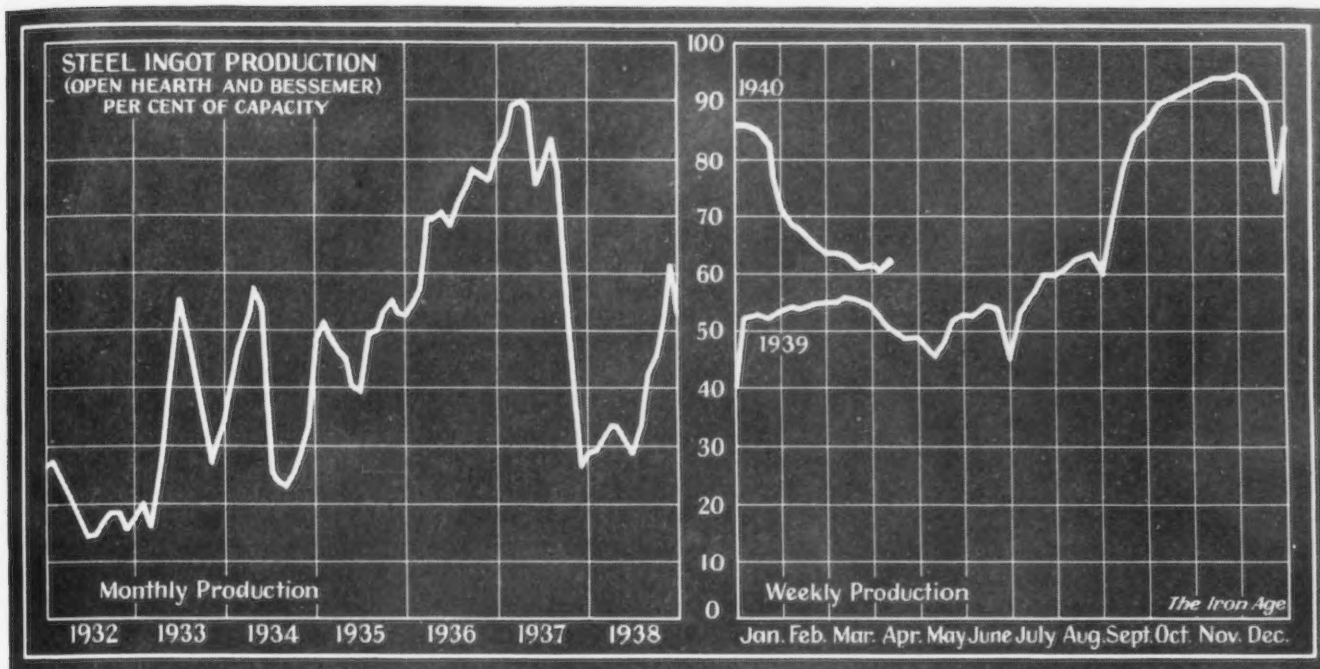
Latest Data Assembled by THE IRON AGE from Recognized Sources

	March 1940	February 1940	February 1939	2 Months 1940	2 Months 1939
<b>Steel Ingots: (net tons)</b>					
Monthly output <sup>a</sup> .....	4,236,050	4,374,625	3,347,288	9,994,323	6,902,562
Average weekly output <sup>a</sup> .....	956,219	1,056,673	836,822	1,166,198	818,809
Per cent of capacity <sup>a</sup> .....	63.0	69.62	56.30	76.83	53.54
<b>Pig Iron: (net tons)</b>					
Monthly output <sup>b</sup> .....	3,270,499	3,311,480	2,307,409	7,343,502	4,743,883
<b>Raw Materials: (gross tons)</b>					
Coke output <sup>c</sup> (net tons) .....		4,172,042	3,148,754	9,117,410	6,593,010
Lake ore consumed <sup>d</sup> .....		4,241,839	2,852,540	9,531,147	5,779,246
Scrap iron and steel consumed <sup>e</sup> .....	2,932,000	3,054,000	2,313,000	6,829,000	4,608,000
<b>Castings: (net tons)</b>					
Malleable, orders <sup>f</sup> .....		34,901	33,234	75,339	71,339
Steel, orders <sup>f</sup> .....		40,913	31,223	84,034	74,195
<b>Finished Steel: (net tons)</b>					
Trackwork shipments <sup>a</sup> .....	8,446	6,898	4,250	13,660	7,159
Fabricated shape orders <sup>f</sup> .....		92,526	82,719	171,355	184,431
Fabricated plate orders <sup>e</sup> .....		25,824	22,903	59,628	43,414
U. S. Steel Corp. shipments <sup>g</sup> .....	931,905	1,009,256	747,427	2,154,848	1,618,293
<b>Fabricated Products:</b>					
Automobile production <sup>h</sup> .....	433,000††	421,820	317,520	871,134	674,482
Steel furniture shipments <sup>g</sup> .....		\$2,263,969	\$1,748,184	\$4,527,602	\$3,530,975
Steel boiler orders <sup>e</sup> (sq. ft.) .....		557,957	817,347	1,083,400	1,947,959
Locomotives ordered <sup>i</sup> .....	40	18	3	46	11
Freight cars ordered <sup>i</sup> .....	1,076	1,172	2,004	1,381	2,007
Machine tool index <sup>j</sup> .....	93.4	92.9	56.1	93.1	54.3
Foundry equipment index <sup>k</sup> .....		179.4	135.3	180.9†	133.3†
<b>Non-Ferrous Metals: (net tons, U. S. only)</b>					
Lead shipments <sup>l</sup> .....		39,176	30,135	79,051	65,058
Lead stocks <sup>l</sup> .....		72,658	138,134		
Zinc shipments <sup>m</sup> .....	51,095	53,048	45,291	161,694	127,758
Zinc stocks <sup>m</sup> .....	73,611	67,086	127,985		
Tin deliveries <sup>n</sup> (gross tons) .....	9,244	6,600	4,105	16,380	8,435
Refined copper deliveries <sup>o</sup> .....	71,893	72,809	51,577	177,354	*
Refined copper stocks <sup>o</sup> .....	159,795	145,393	309,119		
<b>Exports: (gross tons)</b>					
Total iron and steel <sup>p</sup> .....		671,301	359,690	1,254,822	722,362
All rolled and finished steel <sup>p</sup> .....		315,263	110,766	608,619	218,318
Semi-finished steel <sup>p</sup> .....		84,876	14,472	163,508	29,914
Scrap <sup>p</sup> .....		232,800	222,704	418,453	448,138
<b>Imports: (gross tons)</b>					
Total iron and steel <sup>p</sup> .....		6,740	19,149	15,014	46,813
Pig iron <sup>p</sup> .....		2,032	603	3,946	1,189
All rolled and finished steel <sup>p</sup> .....		1,921	10,149	3,685	28,764

† Three months' average. \* Not available. †† Preliminary.

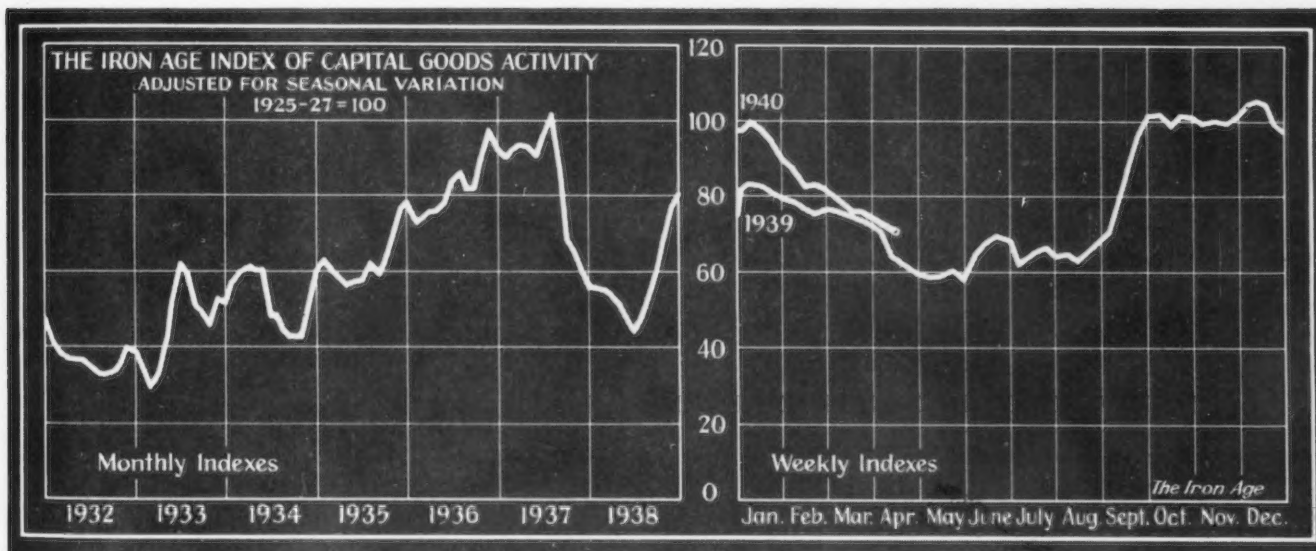
Source of data: <sup>a</sup>American Iron and Steel Institute; <sup>b</sup>THE IRON AGE; <sup>c</sup>Bureau of Mines; <sup>d</sup>Lake Superior Iron Ore Association; <sup>e</sup>Bureau of the Census; <sup>f</sup>American Institute of Steel Construction; <sup>g</sup>United States Steel Corp.; <sup>h</sup>Preliminary figures from Ward's Automotive Reports—Final figures from Bureau of the Census, U. S. and Canada; <sup>i</sup>Railway Age; <sup>j</sup>Foundry Equipment Manufacturers Association; <sup>k</sup>American Bureau of Metal Statistics; <sup>l</sup>American Zinc Institute; <sup>m</sup>New York Commodity Exchange; <sup>n</sup>Copper Institute; <sup>o</sup>Department of Commerce; <sup>p</sup>Institute of Scrap Iron and Steel.

## Ingot Rate Gains a Point to 62% of Capacity



District Ingot Production, Per Cent of Capacity	Pitts- burgh	Chicago	Valleys	Phila- delphia	Cleve- land	Buffalo	Wheel- ing	Detroit	Southern	S. Ohio River	Western	St. Louis	East- ern	Aggre- gate
CURRENT WEEK..	56.0	61.0	50.0	66.0	64.0	41.0	65.0	73.5	77.0	47.5	70.0	45.0	60.0	62.0
PREVIOUS WEEK..	54.0	57.5	49.0	63.0	62.0	46.0	65.0	78.0	77.0	55.0	70.0	45.0	50.0	61.0

## Hesitancy Dominates Trend of Capital Goods Activity



**H**ESITANCY continues to characterize the trend of output of the capital goods industries. Reflecting this condition, THE IRON AGE index declined 1.3 points in the past week to 72.6, establishing a new low point for the current year. Physical output of the industries represented in the index was generally slightly below the preceding week, but analysis of the various data reveals an occasional optimistic note. An example of this is the continued rise in private construction activity. In the past week, private building awards were up 4 per cent, while public awards were down 17 per cent. For the year to date, private work is running 8½ per cent ahead of a year ago. Another example is the Pittsburgh area. Industrial production there showed a slight gain for

the week, but this was more than offset by a drop in both rail and river shipments.

	Week Ended Apr. 13	Week Ended Apr. 6	Comparable Week	
			1939	1929
Steel ingot production <sup>1</sup> .....	77.7	79.0	65.0	123.1
Automobile production <sup>2</sup> .....	86.3	87.5	73.9	127.1
Construction contracts <sup>3</sup> .....	57.2	59.5	80.7	148.4
Forest products carloadings <sup>4</sup> .....	56.5	57.5	48.1	132.7
Production and shipments, Pittsburgh District <sup>5</sup> .....	85.5	86.2	53.9	120.0
Combined index .....	72.6	73.9	64.3	130.3

Sources: <sup>1</sup>THE IRON AGE; <sup>2</sup>Wards Automotive Reports; <sup>3</sup>Engineering News-Record; <sup>4</sup>Association of American Railroads; <sup>5</sup>University of Pittsburgh. The indexes of forest products carloadings and activity in the Pittsburgh area reflect conditions as of the week ended April 6. Other indexes cover the week of April 13.

# ... SUMMARY OF THE WEEK ...

*... Price reductions on flat rolled products stimulate buying at Chicago.*

° ° °

*... Elsewhere, however, effect thus far has been to retard new business.*

° ° °

*... Ingot rate slightly higher, aided by export orders; scrap composite up 4c.*

THE immediate effect of the reduction of \$4 a ton on hot and cold rolled sheets, hot and cold rolled strip and enameling stock, announced on Thursday, April 11, by the subsidiaries of the United States Steel Corp., and followed by all independent competitors, was a setback in the mild seasonal improvement in order volume that was under way. However, early this week Chicago mills had booked considerable business for delivery during the second quarter, though much of it was in the form of blanket commitments, whereas early announcement of sales policies had indicated that only specific orders accompanied by specifications would be accepted at the lower price levels.

While the Chicago experience has not yet been general throughout the country, the fact that the lower prices are subject to withdrawal at any moment may eventually stimulate a buying movement of moderate proportions, though nothing approaching the enormous coverages of the "bargain days" of May, 1939, is expected because, for one thing, inventories in the hands of consumers and warehouses are much heavier than they were at that time. The new price of 1.90c. a lb., base, on hot rolled sheets is \$6 a ton above the low level reached 11 months ago.

The lower quotations are not only effective on new business, but all tonnage previously booked will be invoiced at the new prices as of April 11.

MIXED reactions were caused by the price change. To many in the trade, including a majority of the steel companies, it came as a complete surprise. In previous acute price weakness rumors of concessions have preceded formal price reductions by periods of at least two or three weeks, but in this instance action was both swift and decisive, once it became known that price concessions had been offered. As late as last Thursday many in the trade would have described the sheet and strip price situation as much firmer than it has ordinarily been in periods of less than maximum volume.

As usual, the first price concessions appear to have been offered in Detroit and had not spread to other

districts. In line with its frequently avowed policy of meeting competition and offering no concessions to some buyers that are not available to all, the leading producer met the situation with more promptness than has been customary in the steel trade. Whether the present prices will be withdrawn at an early date or will extend at least throughout the quarter will be determined by circumstances.

Galvanized sheets have not been affected by the change nor black plate except in sheet mill gages of heavier than No. 29. Plate prices are unchanged, though the situation is being closely watched because of the narrow border line between heavy sheets and light plates rolled on continuous mills.

The effect on export prices, which were advanced at the beginning of this month, is yet to be determined. There was heavy coverage for export at prices prevailing before the advance, and in the circumstances a temporary lull would have been expected. Nevertheless volume is still good, with indications that more active warfare may create new demands from Europe. If Norway is recaptured by the Allies, a large volume from the north Scandinavian countries is expected. Canada is also likely to call upon the United States for more steel in view of the probability of expanding munitions manufacturing there.

Export shipments are hampered by a lack of sufficient boats. Steel and scrap are piled up at Atlantic and Pacific ports awaiting shipment. Scrap prices along the seaboard are weak as a result, though in the interior there is a little stronger feeling. A slight upward adjustment at Chicago raises THE IRON AGE scrap composite price 4c. to \$16.08, the first move upward since October.

THE IRON AGE finished steel composite price is lowered from 2.261c., where it has been since late November, to 2.211c. a lb. as a result of reductions on sheets and strip.

NEW business in products other than flat rolled is at least holding its own compared with a month ago, and some moderate gains are reported. Line pipe continues to help out pipe sales. Two lines, one of 14,000 tons and another of 10,000 tons, have been placed.

Railroad equipment business is light, but foreign inquiries include 10 locomotives for the Argentine. The Denver, Rio Grande & Western is inquiring for 550 cars.

Automobile companies are buying fill-in requirements for 1940 models. Ford is reported to have ordered about 20,000 tons of steel.

Ingot production for the industry has gained a point to 62 per cent, increases having occurred in a number of districts, recent export orders being a considerable factor.



# A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous  
Advances Over Past Week in Heavy Type, Declines in Italics

## Rails and Semi-finished Steel

Per Gross Ton:	Apr. 16, 1940	Apr. 9, 1940	Mar. 19, 1940	Apr. 18, 1939
Rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$40.00
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	40.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 5 to 9/32 in. Pittsburgh, Chicago, Cleveland, cents per lb.	2.00	2.00	2.00	1.92
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

## Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.10
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Alloy bars: Pittsburgh, Buffalo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	1.90	2.10	2.10	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.60	2.80	2.80	2.95
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	1.90	2.10	2.10	2.15
Cold rolled sheets: Pittsburgh, Chicago, Gary, Buffalo, Youngstown, Cleveland, Middletown	2.85	3.05	3.05	3.20

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Cents Per Lb.:	Apr. 16, 1940	Apr. 9, 1940	Mar. 19, 1940	Apr. 18, 1939
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.55	2.55	2.55	2.45
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.60
Tin plate, 100 lb. base box: Pittsburgh and Gary	\$5.00	\$5.00	\$5.00	\$5.00

## Pig Iron

Per Gross Ton:				
No. 2 fdy., Philadelphia	\$24.84	\$24.84	\$24.84	\$22.34
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cinti	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	21.34	21.34	21.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago†	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese, seab'd carlots	100.00	100.00	100.00	80.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

## Scrap

Per Gross Ton:				
Heavy melting steel, P'gh.	\$16.25	\$16.25	\$16.75	\$15.00
Heavy melting steel, Phila.	16.75	16.75	17.25	15.50
Heavy melting steel, Ch'go.	15.25	15.125	15.625	12.75
Carwheels, Chicago	16.75	16.75	17.00	12.50
Carwheels, Philadelphia	20.25	20.25	20.25	16.25
No. 1 cast, Pittsburgh	17.75	17.75	18.25	15.25
No. 1 cast, Philadelphia	20.25	20.25	20.25	16.75
No. 1 cast, Ch'go (net ton)	14.75	14.75	13.50	11.75

## Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	\$4.00	\$4.00	\$4.00	\$3.75
Foundry coke, prompt	5.25	5.25	5.25	4.75

## Non-Ferrous Metals

Cents per Lb. to Large Buyers:				
Copper, electrolytic, Conn.	11.50	11.50	11.50	10.50
Copper, lake, New York	11.50	11.50	11.50	10.75
Tin (Straits), New York	47.25	47.00	46.50	47.50
Zinc, East St. Louis	5.75	5.75	5.75	4.50
Zinc, New York	6.14	6.14	6.14	4.89
Lead, St. Louis	5.10	5.05	5.25	4.60
Lead, New York	4.95	4.85	5.10	4.75
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	14.00

# The Iron Age Composite Prices

## Finished Steel

April 16, 1940	2.211c. a Lb.
One week ago	2.261
One month ago	2.261
One year ago	2.286

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

	High	Low
1940.....	2.261c., Jan. 2;	2.211c., Apr. 16
1939.....	2.286c., Jan. 3;	2.236c., May 16
1938.....	2.512c., May 17;	2.211c., Oct. 18
1937.....	2.512c., Mar. 9;	2.249c., Jan. 4
1936.....	2.249c., Dec. 28;	2.016c., Mar. 10
1935.....	2.062c., Oct. 1;	2.056c., Jan. 8
1934.....	2.118c., Apr. 24;	1.945c., Jan. 2
1933.....	1.953c., Oct. 3;	1.792c., May 2
1932.....	1.915c., Sept. 6;	1.870c., Mar. 15
1931.....	1.981c., Jan. 13;	1.883c., Dec. 29
1930.....	2.192c., Jan. 7;	1.962c., Dec. 9
1929.....	2.236c., May 28;	2.192c., Oct. 29

## Pig Iron

\$22.61 a Gross Ton
22.61
22.61
20.61

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

High	Low
\$22.61, Sept. 19;	\$20.61, Sept. 12
23.25, June 21;	19.61, July 6
23.25, Mar. 9;	20.25, Feb. 16
19.73, Nov. 24;	18.73, Aug. 11
18.84, Nov. 5;	17.83, May 14
17.90, May 1;	16.90, Jan. 27
16.90, Dec. 5;	13.56, Jan. 3
14.81, Jan. 5;	13.56, Dec. 6
15.90, Jan. 6;	14.79, Dec. 15
18.21, Jan. 7;	15.90, Dec. 16
18.71, May 14;	18.21, Dec. 17

## Steel Scrap

\$16.08 a Gross Ton
16.04
16.54
14.42

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

High	Low
\$17.67, Jan. 2;	\$16.04, Apr. 9
22.50, Oct. 3;	14.08, May 16
15.00, Nov. 22;	11.00, June 7
21.92, Mar. 30;	12.92, Nov. 10
17.75, Dec. 21;	12.67, June 9
13.42, Dec. 10;	10.33, Apr. 29
13.00, Mar. 13;	9.50, Sept. 25
12.25, Aug. 8;	6.75, Jan. 3
8.50, Jan. 12;	6.43, July 5
11.33, Jan. 6;	8.50, Dec. 29
15.00, Feb. 18;	11.25, Dec. 9
17.58, Jan. 29;	14.08, Dec. 3

# ... THIS WEEK'S MARKET NEWS ...

## STEEL OPERATIONS

*... Trend is slightly upward in some districts ... Industry rate 62%*

STEEL operations are advancing moderately in some districts, while declines are less numerous, the net result being an estimated gain of one point to 62 per cent in this week's ingot production.

The PITTSBURGH district has gained two points to 56 per cent, the CHICAGO district three and a half points to 61 per cent, the Youngstown district one point to 50 per cent, the CLEVELAND-LORAIN district two points to 64 per cent, while the PHILADELPHIA district, for which the rate recently has apparently been underestimated, is adjusted upward three points to 66 per cent. There have been losses in the BUFFALO, DETROIT and SOUTHERN OHIO districts, but in districts not mentioned the rates are substantially unchanged, the overall result being a gain for the industry as a whole.

## NEW BUSINESS

*... Price cuts stimulate some buying at Chicago, not so elsewhere*

SUBSTANTIAL orders for sheets and strip at \$4 a ton off were being placed by CHICAGO district consumers Tuesday, the volume being such that only a few days more will see the quarter entirely filled, according to some sellers. Many of these orders, however, were blanket commitments.

At PITTSBURGH and elsewhere there has been no grand rush of steel consumers to buy sheets and strip at the new low prices and total bookings on all steel products are not changed much if any from a week ago. Export demand still predominates with a continuation of slight seasonal expansion in domestic requirements. This latter condition may be nipped in the bud for a while, however, owing to the uncertainty brought about by the sheet price situation. Total orders so far this month are running moderately ahead of the same number of days in March, with export business a major factor.

As the 1941 automobile model season approaches, the decline in steel demand occasioned by the slackening in motor

car production is expected to be offset in CHICAGO by higher activity in steel furniture, domestic and electric appliances, construction and agricultural machinery. According to some estimates, private construction nationally is running ahead of Federal building. Inventories are believed to be quite low, and replacement orders should be numerous soon.

Export inquiry for alloys continues good, and CHICAGO electric furnace capacity is booked well ahead.

Up to Tuesday at CLEVELAND and YOUNGSTOWN the depressed price structure of hot and cold rolled sheets and strip and enameling sheets had failed to bring out new tonnage in volume comparable to previous "bargain" periods of the past two years. The principal reason apparently is the fact consumers will obtain the \$4 lower price on shipments over the remainder of this quarter, whereas in previous price wars this stipulation was not so clearly understood.

The price cuts of the past week have dried up new buying in the Philadelphia area. Previous to Friday, the volume of incoming orders was showing encouraging gains in practically all lines. Coincidental with the announcement of the lower prices, there was a general solicitation of business at the new levels, and, while some small tonnages were taken, most sellers adopted a very cautious attitude, preferring to wait for the confusion to die before making commitments. Sales to South America consisting largely of tank plates, in the past week were heavier than usual.

Jobbers' business in specialty steels continues brisk on the Pacific Coast, but construction steel activity is slower. Government military construction in Alaska, and large pipeline projects to be up for bids soon in southern California tend to brighten the fabricators' outlook somewhat, however, and announcements of plant expansions lend an optimistic tone. Active mining operations furnish a good market for specialties used in that industry.

The revised Illinois occupational retailers tax, which applies the 3 per cent levy to goods sold in Illinois even though shipped from another state, is being passed on to consumers by CHICAGO steel producers effective on new sales from April 15. Contracts entered into prior to that date will be unaffected.

## PRICES

*... Sheet and strip quotations reduced \$4 a ton, effective April 11*

AFTER several days of uncertainty and rumors, hot and cold rolled sheet prices broke \$4 per ton, from 2.10c. to 1.90c., late Thursday April 11. Carnegie-Illinois Steel Corp. announced that it was meeting competition and would apply the lower price on shipments over the balance of this quarter, although the concession presumably was liable to withdrawal without notice.

Within a short time independent producers notified their customers of similar action.

Soon enameling sheets, iron sheets, long ternes, and hot and cold rolled strip steel went down \$4 per ton also. Coated sheets were not affected immediately. Black plate prices are lower only in gages lighter than No. 29. Galvanized sheets are not included in the recent price changes.

The price war was the fourth in two years, and brought chagrin from customers as well as producers, who have found the sharp peaks and valleys difficult to cope with. However, the current situation failed to arouse interest comparable to the previous breaks.

The price cut is reminiscent of the bargain sale in May, 1939, except in one important aspect. Where last fall tremendous tonnages were booked immediately because it was stated the prices would be withdrawn, last week's situation is that only moderate sheet and strip tonnage has been placed and there is as yet no intimation that the new low spot price is to be withdrawn, although that of course is a possibility.

Furthermore the move was sudden and had not been preceded by a weak market. It is believed that the softness uncovered had not been of long duration and the action taken seems to indicate that any further softness will be immediately met by producers so that there remains little or no advantage in reducing the price further. Even though the prices named last week were to apply "on shipments in the United States up to and including June 30" there was no definite assurance that the prices themselves would be available through this quarter.

Whether they establish a new low level, as some logically argue, or whether they are merely spot and corrective quotations, remains to be seen. Meanwhile, some buyers are on the sidelines ready to take advantage of the situation, should the price level on the products mentioned drop further. Such a move, however, is discounted in steel circles.

Columbia Steel Co. informed its customers of a drop of 20c. per hundred pounds in the PACIFIC COAST base prices of hot and cold rolled sheets, hot rolled strip, and porcelain enameling stock, and in the delivered price of cold rolled strip, on which there is no Pacific Coast base. Shipments will be protected until June 30. Other mills followed.

The effect of the reduction of prices on flat rolled products in the export market is yet to be determined. Exporters had only recently, about April 1, advanced export prices to a level about equal to domestic prices, and these prices were undergoing the usual test when the break in domestic prices occurred. The new export prices have been reaffirmed within the past few days.

## IRON ORE

*... 1940 movement slow in getting under way*

WITH only a few vessels en route to the Lake Superior ore docks early this week, it appeared likely the 1940 movement of iron ore would barely get under way this month. Meanwhile, mine operators are obtaining ore tonnage figures from consumer furnaces and holding their annual ore meetings. Uncertainty created by European war developments has made plans for the early season more difficult.

## PIG IRON

*... Steel price weakness disturbs market; foundries less active*

STEEL price weakness has unavoidably caused hesitancy among pig iron buyers and new business is light in most areas. Exporters face cancellation of orders from Scandinavian countries, a consequence of the Germany invasion. In New York district and in some other centers foundries report somewhat lower melting rates.

The still expanding machine tool industry is a bright spot in the pig

iron market at CLEVELAND where shipments so far in April are a few hundred tons ahead of March. New business at PITTSBURGH continues dull while sales and shipments in the PHILADELPHIA district are running ahead of March. Foundries in NEW ENGLAND are less active and sales have declined. SOUTHERN OHIO activity is little changed, the machine tool and farm implement melters continuing active.

## SEMI-FINISHED STEEL

*... Export demand is a major factor ... Domestic buying fair*

EXPORT demand remains a major factor in semi-finished steel bookings at PITTSBURGH, although domestic business is holding at fairly good levels. Whether any important buying move by non-integrated sheet makers materializes will depend, of course, upon the volume of low-priced sheet tonnage booked by non-integrated makers. This situation is yet to be clarified.

Export inquiry continues strong, according to CLEVELAND sellers, and includes a wide range of semi-finished from rods to billets. Lack of ocean bottoms is an acute problem preventing the closing of much business. Steel is reported piled high on docks at several ocean ports.

## PLATES

*... Prices on lighter gages jeopardized by sheet cut*

THE break in sheet and strip prices has not been reflected in the plate market but, as in previous periods of weak prices, light plates rolled on continuous mills are jeopardized. Great difficulty is always encountered in attempting to maintain prices at or near the dividing point between continuous mill sheets and plates.

There has been some buying of light gage plates on the part of Eastern makers of domestic oil burner tanks for the first time this season, but otherwise the market is dull and featureless. Plate prices are firm and unchanged. Cutting off of the Scandinavian market has put a considerable crimp in plate exports and the continued fear of an invasion of Holland makes that market uncertain. Some export houses have been feeling out the new export plate price. There is reason to believe, however, that the current price of 2.15c. f.a.s. is holding firm.

CHICAGO plate fabricators have been well occupied lately with business from oil refineries and Federal dam projects. Local construction projects probably can be counted on to bring an additional demand as weather conditions improve.

Consolidated Steel Corp., Los Angeles, will fabricate about 825 tons of plates for the Leevining Creek conduit of the Los Angeles Department of Water & Power in Mono County, Calif. Construction of two distribution lines involving large diameter steel pipe for the Los Angeles Metropolitan Water District has been officially authorized and bids will be taken soon. One line is about 25 miles long, the other 27 miles; it is expected that the bids will be taken in sections.

## SHEETS AND STRIP

*... Price cuts have retarded placing of new orders*

IT is still too early to unscramble some of the mixed viewpoints which asserted themselves following the "meeting of competition" last week on certain flat rolled products. There are many who believe that the sudden and unlooked-for slash in flat rolled prices may, in itself, be responsible for the establishment of a bottom with no further cuts in prospect. Whether the price level is restored to what it was before the break, however, remains to be seen. Meanwhile, all unfilled tonnage on mill books is being written down to the new quotation, effective on shipments from April 11.

Buyers in the vicinity of CLEVELAND and YOUNGSTOWN maintained a cautious attitude when solicited for 1.90c. tonnage in hot and cold rolled sheets and strip and enameling sheets. The first reaction of some consumers was one of resentment. Chagrin was widespread among flat rolled sellers in Ohio, for the peaks and valleys encountered over the past two years have been a serious problem. In some quarters the opinion was expressed that the reduced level might be maintained longer than in any previous break. Cold strip sellers pointed out that only 0.50 carbon-and-under prices were off \$4 per ton, with commodity strip, but not higher carbon cold strip.

Orders placed since the new spot prices became effective were not overly large in number or tonnage. Sheet and strip specifications at PITTSBURGH continue to run substantially ahead of a month ago, most of which improvement has emanated from fill-in auto-



motive orders and a slight pick-up in miscellaneous business. Clarification is expected to manifest itself this week, with respect to whether or not consumers will buy sheets and strip at the present spot price or await further developments.

At the start of business Tuesday morning CHICAGO sheet and strip consumers began to cover at the \$4 a ton concession for delivery before June 30. Every sales office in the CHICAGO district had entered numerous blanket orders and taken considerable tonnage by noon Tuesday, and many believed it would require only a few days more of such activity to fill their books for the quarter.

The announcement of the cut of \$4 in sheet prices took the NEW YORK trade completely by surprise as the market had been firm there up until Friday morning. What business that has come in since then, it is felt would have come in anyway, and district sales managers look upon the cut as an outright gift to their customers. Stove makers and refrigerator builders have been reordering at regular intervals, and fairly substantial orders from both sources have been received in the past week. General sheet buying is spotty.

Stove manufacturers in the St. Louis district are going in more and more for the use of sheets. This is due to a price competitive situation and to meet the demands especially of mail order houses for lower priced stoves.

## MERCHANT BARS

*... Bookings show little change from a month ago*

**A**LTHOUGH some bar makers at PITTSBURGH are able to show an order level comparable to a month ago, others have not booked as much tonnage so far this month as they did in March. Export buying remains a factor and there may be some hesitation in general buying predicated on a normal amount of lethargy engendered when the flat rolled price structure weakens. Bar prices, however, continue firm with no weaknesses expected.

At CLEVELAND and YOUNGSTOWN demand from cold finishers who have fair order volume from the machinery and munitions fields remains active. April at the half-way mark was improved as against the corresponding March period and sellers feel confident the remainder of the month will

produce enough business to make a very favorable comparison.

Manufacturers of agricultural machinery, forgers and jobbers are the main consumers in the CHICAGO market today. The farm equipment plants are operating at an estimated 75 per cent of capacity, while drop forgers who are busy with orders from the oil and aircraft industries are operating between 70 and 80 per cent. Current bookings are little changed from a week ago.

## REINFORCING BARS

*... Awards are 10,500 tons, inquiries 4800 tons*

**R**EINFORCING steel awards total 10,500 tons, of which 6000 tons is for officers' quarters in the Pacific and Atlantic sectors in the Panama Canal Zone. The total Panama Canal project amounted to over 13,000 tons of bars and has now been placed in its entirety.

New reinforcing steel projects of 4800 tons are about the same as those for last week. The only inquiry of size is 1267 tons for the Grand Coulee Dam, Washington.

The price situation continues weak.

## CAST IRON PIPE

*... Some seasonal gain in orders  
... Prices unsettled*

**B**USINESS is picking up as might be expected at this time of the year, but is a long way from active. Pipe foundries are meeting stiff competition from composition pipe makers, and as a result the market for cast iron pipe is more or less unsettled and often prices are shaded.

## RAILROAD BUYING

*... Foreign inquiries for 10 engines and 180 cars*

**T**WO new foreign inquiries made their appearance in the past week, but the railroad market as a whole is contributing little support to the steel operations. The foreign inquiries involve 10 locomotives for Argentine State Railways and 150 freight, five mail and 25 baggage cars for Canadian National.

New domestic inquiries include 500 box cars for Denver, Rio Grande &

Western and 30 box and 20 flat cars for Panama Canal. Bethlehem Steel Co. has been awarded 1500 tons of rails by Richmond, Fredericksburg & Potomac and 500 tons by Baltimore & Ohio.

## TUBULAR GOODS

*... Line pipe is leading tonnage producer*

**T**HE level of tubular goods sales at PITTSBURGH in the past week was a shade above the week before with gains registered in oil-country goods, standard pipe, and miscellaneous line pipe. Even though the upward trend in sales is expected to continue, no marked activity is looked for in the immediate future and expected improvement in oil-country business is entirely predicated on the fact that this year's drillings will be about 15 per cent above a year ago.

Line pipe is in the spotlight as the leading tonnage producer for OHIO mills. Standard pipe is seasonally better and prices have become firmer. Oil country casing is running ahead of March in order volume. Youngstown Sheet & Tube Co. is reported to have been awarded around 10,000 tons in various sizes for a 130-mile line in Montana for the Montana Dakota Utilities Co.

Immediate construction of two distribution lines for the Colorado River aqueduct, involving large quantities of large diameter steel pipe, has been authorized by the directors of the Los Angeles Metropolitan Water District. One line, about 25 miles long, will extend westerly from San Rafael Tunnel No. 2 to Arcadia reservoir in Santa Monica. It is expected that the line will be of welded steel construction and will include a 4000-ft. tunnel through the hills north of Hollywood. The first six-mile section probably will be advertised almost immediately and the balance in May. The Orange County feeder will extend from a point near San Dimas to Fullerton, Santa Ana, and Orange, about 27 miles. Advertisement for bids is believed to be imminent.

Northern Natural Gas Co., Omaha, Neb., has ordered approximately 14,000 tons of pipe for looping and extensions to the upper part of the Northern Natural Gas System. Sixty miles of 24-in. was divided between National Tube Co. and A. O. Smith Corp., while about 50 miles of 12, 8, 4, and 2 in. was divided between Youngstown Sheet & Tube Co. and Republic Steel Corp.

## STRUCTURAL STEEL

*... Private work is gaining while Federal work declines*

FABRICATED structural steel lettings advanced to 9950 tons from 5450 tons last week. With the exception of 2500 tons for a foundry for the Cincinnati Milling Machine Co., Cincinnati, awards are in small tonnages.

New structural projects are slightly lower than last week at 16,600 tons and include 3500 tons for the Benjamin Franklin High School in New York; 2300 tons for the superstructure of a bridge over Eastchester Creek for the Triborough Bridge Authority, New York; 2000 tons for school No. 99 in the Bronx, New York; 1350 tons for a plant for the Loose-Wiles Biscuit Co. at Oakland, Cal., and 1000 tons for a parochial school in New York. Private undertakings are in better volume. Federal work is declining.

## TIN PLATE

*... Operations unchanged at 63%*

TIN plate operations this week continue unchanged at 63 per cent, with specifications holding at recent levels. Shipments, of course, have picked up, especially to West Coast points owing to the impending ocean freight rate increase.

## WIRE PRODUCTS

*... Seasonable improvement is making only mild progress*

TOTAL wire and wire product sales at PITTSBURGH are a shade larger than a week ago and, on some products such as rods and manufacturers' wire, bookings are running ahead of a month ago. Although domestic activity is slightly accelerated, foreign orders remain an important factor.

New orders at CHICAGO are up slightly from a week ago and a further improvement, especially in merchant products, should be seen as the spring season advances. Industrial wire users in this district, chief among which are suppliers to the automobile industry, may show a slight decline as the 1940 model season draws to a close.

Demand continues spotty at CLEVELAND, with the two-day snowstorm late last week stemming temporarily

the slight improvement shown by merchant products. Manufacturers' wire is moving at about the level of other recent weeks. Export inquiry continues strong from many parts of the globe, but the Scandinavian situation has upset negotiations for several large tonnages and made uncertain the delivery of some wire already produced.

Business on the PACIFIC COAST continues good in wire specialties for the mining industry.

### Allegheny Ludlum First Quarter Profit \$1,000,297

ALLEGHENY LUDLUM STEEL CORP., Pittsburgh, reports a net profit of \$1,000,297 for the first quarter of 1940 after depreciation, depletion, Federal taxes, and other deductions, equivalent to 75c. a share on outstanding shares of common stock. This compares with a net profit of \$206,582 or 12c. a share in the corresponding 1939 quarter.

### Progressive Welder Moves Into New Detroit Plant

WITH the biggest backlog of orders in its history, Progressive Welder Co., designer and manufacturer of resistance welding and hydraulic punching equipment, has begun production in its new, modern office and factory headquarters on East Outer Drive, Detroit. The new plant, of modern design and layout, has the greater portion of its 30,000 sq. ft. of floor space divided into three main manufacturing departments. These are laid out for production of automatic spot welding equipment, hydraulic punching and riveting equipment and a gun department for the manufacture of portable spot welding equipment. The company, which was organized in 1935, formerly occupied an old factory building on Piquette Avenue.

### Outlaw Strike Closes Four J. & L. Coal Mines

PITTSBURGH—Approximately 4500 miners were idle this week when pickets closed four mines of Jones & Laughlin Steel Corp. subsidiary mining companies in Washington and Greene counties.

The shutdown was precipitated by 140 miners who were laid off a month or so ago because of installation of loading machinery at the company's Shannopin mine. At that time the controversy at the Shannopin mine had been amicably settled and the majority of miners there had voted to continue working. It is expected that this outlaw strike will be settled by the union soon as the present situation is a violation of the company's contract with the union.

### Non-Union Worker Sues Over SWOC Seniority Rights

INDIANAPOLIS—Charles E. Blue, an employee of the Chapman-Price Steel Co., subsidiary of Continental Steel Corp., Kokomo, Ind., has challenged the firm's right to disregard established seniority provisions as a result of a contract with the SWOC. Blue is not a union member and has filed suit in the Circuit Court complaining that the company's contract with the union deprives him of his seniority rights.

## Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Apr. 16, 1940	Apr. 9, 1940	Mar. 19, 1940	Apr. 18, 1939	1940	1939
Fabricated structural steel awards .....	9,950	5,450	13,750	29,100	228,710	295,910
Fabricated plate awards .....	4,105	3,870	1,905	0	52,005	49,015
Steel sheet piling awards .....	1,505	420	970	0	12,095	18,165
Reinforcing bar awards .....	10,500	13,200	14,250	8,675	135,720	142,445
Total Letting of Construction Steel..	26,060	22,940	30,875	37,775	428,530	505,535

# IRON AND STEEL SCRAP

**A**PRIL 16—Stronger sentiment at Chicago is reflected in an advance of 12½c. in the average price of No. 1 heavy melting steel brought about by quoting a flat \$15.25, representing what brokers are willing to pay to cover the last mill sale at that price. Dealers are asking more. On the other hand, the market undertone is slightly weaker at Pittsburgh, although prices are unchanged. Quotations are unchanged at Philadelphia. As a result, the composite price is back up to \$16.08, where it was two weeks ago. Elsewhere there is little change in prices. Buffalo quotations are up 25c. on the basis of a sale of 5000 tons of No. 2 at a 50c. increase over the previous sale.

War developments in Scandinavia have made sentiment stronger at interior points, but on the coast the effect has been the reverse. Shipments to Sweden, small but steady, have been cut off and some fear that the important Italian market may be lost, should Italy become involved. On the West Coast, lack of export buying has caused accumulation of stocks in dealers' yards, particularly in southern California. Softness is evident in prices, and continued scarcity in ocean bottoms is expected to be a bearish factor for some time in the domestic market.

## **Pittsburgh**

The market undertone is slightly weaker than last week when European war news furnished a small amount of activity. No. 1 heavy melting is quotably unchanged at \$16 to \$16.50, while some brokers are able to pick up odd cars from dealers at \$15.75. Railroad specialties remain strong, due to good demand from steel foundries.

## **Chicago**

This market is considerably stronger sentimentally this week, largely on account of war developments in Scandinavia, even though there has been no further mill sale since the \$15.25 sale week before last. The weather has improved in the past week in the Middle West but considerably more scrap than is now moving in this district should be seen as the season advances. Dealers are asking \$15.50 for heavy melting steel while brokers are offering from \$15 to \$15.25 a ton to cover their \$15.25 orders. Whether the brokers or the dealers will weaken from their position first is impossible to predict at this writing but the entire tone of the market is noticeably stronger.

## **Philadelphia**

The price reductions in flat rolled products announced in the past week have

created considerable uncertainty in the scrap market here and all outstanding negotiations have been temporarily suspended. Pricewise, the situation is little changed, but the past week's developments have injected several elements of potential weakness into the market. One such element is the increasing belligerency of Italy toward the Allies. Should Italy openly align herself with Germany, Italy's imports would undoubtedly be immediately cut off. Over the past several months scrap exports to Italy have accounted for a major portion of this district's export activity. A mill in the Harrisburg area recently purchased a small tonnage of No. 1 steel at \$16. While this material was purchased from sources outside Harrisburg, it did carry a favorable freight rate.

## **Youngstown**

The underlying tone is strong but the immediate situation shows no change. One mill which not long ago bought at \$16.50 has sought No. 1 at \$16, but encountered considerable reluctance on the part of dealers to part with tonnages at that figure under current conditions. Open-hearth operations have improved here but at the same time the break in sheet prices and the European situation have created uncertainty.

## **Cleveland**

Current nominal published prices for heavy melting grades are evidently fair, considering all angles of the market here this week. Only very small amounts of scrap have been obtained by mills at the \$16 figure, however. In addition to the uncertain factors bothering dealers and buyers everywhere throughout the country, the opening of navigation overhangs the market here. Tonnages coming by vessel are not as large as in other recent years, but aggregate somewhere in the vicinity of 30,000 tons. The No. 1 cupola cast price has been out of line inadvertently and is corrected this week. Cast iron is strong here due to good foundry demand.

## **Buffalo**

A large consumer in the district purchased 5000 tons of No. 2 heavy melting steel this week at a price in the range of \$14.50 to \$15, a 50c. increase over a previous sale. At the same time the largest consumer in the district reduced its bids to \$15 for No. 1 steel. Sales of No. 1 machinery cast have raised the value of this commodity 25c. to a range of \$18.25 to \$18.75.

## **St. Louis**

In sympathy with a stronger demand in Eastern centers, the prices of some specialties in the scrap iron list were 25c. and 50c. a ton higher, while some steel melting grades were 25c. lower than the preceding week. The new crisis in the European war has had no effect yet on the scrap iron market here, and there is uncertainty as to what that effect will be. Railroad lists: Southern Railway, 3900 tons; Missouri-Kansas-Texas, 1000 tons.

## **Cincinnati**

While trading in old materials is desultory, dealer feeling tends more optimistic in the light of recent world developments. Bids are unchanged, despite general market apathy, in the hope that anticipated improvement is not far off. Mill interest is all but absent.

## **Birmingham**

Local pipe plants are operating slower than in some time and this unseasonable trend is reflected in a very dull scrap market and by the cessation of operations of two open-hearth furnaces of the Republic company and one of the Tennessee company. Scrap prices have not changed from last week and no changes are expected soon. Cast scrap remains at \$14.50 but market observers are frank to say there is no market for cast at almost any price.

## **Detroit**

Somewhat slower operations in the Detroit area contribute to a moderate weakness in the local scrap market, although there is no appreciable change in prices. One auto body plant list closing at mid-week was expected to offer some indication of the current trend. Market activity otherwise continues at a slightly slackened pace although it is reported that outside factors are responsible for some activity.

## **New York**

Last week a small boat completed loading of scrap for Sweden, and other boats were scheduled, but whether this material will be delivered is very problematical in view of the spread of war to Scandinavia and the withdrawal of Swedish boats from trade. Scrap exporters are watching developments in Italy closely since this country has been the largest buyer of scrap of any of the European countries. With shipments practically absent for the present, exporters are turning their back on offerings and a lowering of dealer buying prices would not be surprising. Borings and turnings are somewhat softer for domestic delivery.

## **Boston**

Steel turnings have been sold for Welton consumption at \$3.90 a ton on cars, and for Conshohocken consumption at \$4.15 on cars. Textile and machinery cast is moving in fair volume at \$15.50 to \$17 a ton, delivered, and one lot has been sold to a central Massachusetts consumer at \$17.50. Otherwise the domestic market is featureless, although sentiment seems better. With boats not available, the export market has eased about 50c. a ton.

## **Toronto**

More active interest developed in the iron and steel scrap markets during the week and prices showed indications of firmness. Machinery cast and dealers cast were marked up 50c. per ton with dealers now offering \$18 and \$17 per gross ton respectively. While other materials remained unchanged, some dealers have been paying slightly above list to bring out offerings.



# Iron and Steel Scrap Prices

## PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$16.00 to \$16.50
Railroad heavy melting	17.00 to 17.50
No. 2 heavy melting	14.50 to 15.00
Railroad scrap rails	17.50 to 18.00
Rails 3 ft. and under	20.50 to 21.00
Comp. sheet steel	16.00 to 16.50
Hand bundled sheets	15.00 to 15.50
Heavy steel axle turn.	14.00 to 14.50
Machine shop turnings	10.00 to 10.50
Short, shov. turnings	11.50 to 12.00
Mixed bor. & turn.	8.75 to 9.25
Cast iron borings	8.75 to 9.25
Cast iron carwheels	18.00 to 18.50
Heavy breakable cast	15.00 to 15.50
No. 1 cupola cast	17.50 to 18.00
RR. knuckles & coup.	20.00 to 20.50
Rail coil springs	20.50 to 21.00
Rail leaf springs	20.50 to 21.00
Rolled steel wheels	20.50 to 21.00
Low phos. billet crops	21.00 to 21.50
Low phos. punchings	20.00 to 20.50
Low phos. heavy plate	19.50 to 20.00
Railroad malleable	21.00 to 21.50

## PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$16.50 to \$17.00
No. 2 hvy. mltng. steel	15.00 to 15.50
Hydraulic bund., new	16.50 to 17.00
Hydraulic bund., old	14.00 to 14.50
Steel rails for rolling	20.50 to 21.00
Cast iron carwheels	20.00 to 20.50
Hvy. breakable cast	18.50 to 19.00
No. 1 cupola cast	20.00 to 20.50
Mixed yard (f'd'y) cast	16.50 to 17.00
Stove plate (steel wks.)	15.00 to 15.50
Railroad malleable	21.00 to 22.00
Machine shop turn.	9.50 to 10.00
No. 1 blast furnace	9.00 to 9.50
Cast borings	10.50 to 11.00
Heavy axle turnings	14.00 to 14.50
No. 1 low phos. hvy.	21.00 to 21.50
Couplers & knuckles	21.00 to 21.50
Rolled steel wheels	21.00 to 21.50
Steel axles	21.50 to 22.00
Shafting	22.00 to 22.50
Spec. iron & steel pipe	16.00 to 16.50
Cast borings (chem.)	14.00 to 14.50

## CHICAGO

Delivered to Chicago district consumers:

Per Gross Ton	
Hvy. mltng. steel	\$15.25
Auto. hvy. mltng. steel alloy free	\$14.00 to 14.25
No. 2 auto steel	12.00 to 12.50
Shoveling steel	15.00 to 15.25
Factory bundles	14.50 to 14.75
Dealers' bundles	13.00 to 13.25
No. 1 busheling	14.00 to 14.25
No. 3 busheling, old	7.00 to 7.50
Rolled carwheels	17.50 to 18.00
Railroad tires, cut	18.00 to 18.50
Railroad leaf springs	17.25 to 17.75
Steel coup. & knuckles	17.50 to 18.00
Axle turnings	14.00 to 14.50
Coil springs	18.50 to 19.00
Axle turn. (elec.)	16.00 to 16.50
Low phos. punchings	18.00 to 18.50
Low phos. plates 12 in. and under	17.50 to 18.00
Cast iron borings	8.50 to 9.00
Short shov. turn.	9.00 to 9.50
Machine shop turn.	8.50 to 9.00
Rerolling rails	18.00 to 18.50
Steel rails under 3 ft.	17.75 to 18.25
Steel rails under 2 ft.	18.50 to 19.00
Angle bars steel	17.50 to 18.00
Cast iron carwheels	16.50 to 17.00
Railroad malleable	19.25 to 19.75
Agric. malleable	13.75 to 14.25

Per Net Ton

Iron car axles	21.00 to 21.50
Steel car axles	20.00 to 20.50
Locomotive tires	14.00 to 14.50
Pipes and flues	10.50 to 11.00
No. 1 machinery cast	14.50 to 15.00
Clean auto. cast	14.50 to 15.00
No. 1 railroad cast	14.00 to 14.50
No. 1 agric. cast	12.50 to 13.00
Stove plate	9.00 to 9.50
Grate bars	9.50 to 10.00
Brake shoes	10.00 to 10.50

## YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$16.00 to \$16.50
No. 2 hvy. mltng. steel	15.00 to 15.50
Low phos. plate	19.00 to 19.50
No. 1 busheling	15.25 to 15.75
Hydraulic bundles	15.50 to 16.00
Machine shop turn.	10.00 to 10.50

## CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$15.50 to \$16.00
No. 2 hvy. mltng. steel	14.50 to 15.00
Comp. sheet steel	15.00 to 15.50
Light bund. stampings	12.50 to 13.00
Drop forge flashings	13.50 to 14.00
Machine shop turn.	8.50 to 9.00
Short shov. turn.	9.50 to 10.00
No. 1 busheling	14.25 to 14.75
Steel axle turnings	13.50 to 14.00
Low phos. billet and bloom crops	20.50 to 21.00
Cast iron borings	9.50 to 10.00
Mixed bor. & turn.	9.50 to 10.00
No. 2 busheling	9.50 to 10.00
No. 1 cupola cast	19.00 to 19.50
Railroad grate bars	13.50 to 14.00
Stove plate	13.50 to 14.00
Rails under 3 ft.	20.00 to 20.50
Rails for rolling	19.50 to 20.00
Railroad malleable	19.00 to 19.50

## BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$15.75 to \$16.25
No. 2 hvy. mltng. steel	14.50 to 15.00
Scrap rails	18.50 to 19.00
New hvy. b'ndled sheets	14.50 to 15.00
Old hydraulic bundles	12.50 to 13.00
Drop forge flashings	14.50 to 15.00
No. 1 busheling	14.50 to 15.00
Machine shop turn.	10.50 to 11.00
Shov. turnings	12.00 to 12.50
Mixed bor. & turn.	10.00 to 10.50
Cast iron borings	10.00 to 10.50
Knuckles & couplers	19.50 to 20.50
Coil & leaf springs	19.50 to 20.50
Rolled steel wheels	19.50 to 20.50
No. 1 machinery cast	18.25 to 18.75
No. 1 cupola cast	17.25 to 17.75
Stove plate	14.50 to 15.00
Steel rails under 3 ft.	21.50 to 22.00
Cast iron carwheels	17.50 to 18.00
Railroad malleable	19.00 to 19.50

## ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	\$14.25 to \$14.75
No. 1 hvy. melting	13.75 to 14.25
No. 2 hvy. melting	12.50 to 13.00
No. 1 locomotive tires	14.75 to 15.25
Misc. stand. sec. rails	14.75 to 15.25
Railroad springs	16.25 to 16.75
Bundled sheets	9.00 to 9.50
No. 1 busheling	13.00 to 13.50
Cast bor. & turn.	5.00 to 5.50
Machine shop turn.	6.50 to 7.00
Heavy turnings	9.25 to 9.75
Rails for rolling	17.00 to 17.50
Steel car axles	18.50 to 19.00
No. 1 RR wrought	10.00 to 10.50
No. 2 RR wrought	12.50 to 13.00
Steel rails under 3 ft.	18.00 to 18.50
Steel angle bars	14.75 to 15.25
Cast iron carwheels	15.50 to 16.00
No. 1 machinery cast	15.75 to 16.25
Railroad malleable	15.50 to 16.00
Breakable cast	13.75 to 14.25
Stove plate	10.50 to 11.00
Grate bars	9.50 to 10.00
Brake shoes	10.00 to 10.50

## CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	\$12.25 to \$12.75
No. 2 hvy. mltng. steel	10.25 to 10.75
Scrap rails for mltng.	16.75 to 17.25
Loose sheet clippings	7.75 to 8.25
Hydrau. b'ndled sheets	11.75 to 12.25
Cast iron borings	3.50 to 4.00
Machine shop turn.	4.75 to 5.00
No. 1 busheling	8.75 to 9.25
No. 2 busheling	2.75 to 3.00
Rails for rolling	18.25 to 18.75
No. 1 locomotive tires	13.75 to 14.25
Short rails	18.75 to 19.25
Cast iron carwheels	14.25 to 14.75
No. 1 machinery cast	15.75 to 16.25
No. 1 railroad cast	13.75 to 14.25
Burnt cast	7.50 to 8.00
Stove plate	7.50 to 8.00
Agricul. malleable	12.25 to 12.75
Railroad malleable	15.25 to 15.75
Mixed hvy. cast	13.25 to 13.75

## BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	\$14.50
No. 2 hvy. melting steel	13.50
No. 1 busheling	14.00
Scrap steel rails	15.00
Steel rails under 3 ft.	16.00
Rails for rolling	16.50
Long turnings	5.00
Cast iron borings	7.50
Stove plate	10.00
Steel axles	18.00
No. 1 RR wrought	14.00

No. 1 cast	\$16.00
No. 2 cast	12.50
Cast iron carwheels	13.00
Steel car wheels	16.00

## DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	\$12.50 to \$13.00
No. 2 hvy. mltng. steel	11.50 to 12.00
Borings and turnings	6.75 to 7.25
Long turnings	7.25 to 7.75
Short shov. turnings	8.25 to 8.75
No. 1 machinery cast	15.50 to 16.00
Automotive cast	16.25 to 16.75
Hvy. breakable cast	13.00 to 13.50
Stove plate	9.25 to 9.75
Hydraul. comp. sheets	13.75 to 14.25
New factory bushel	12.00 to 12.50
Sheet clippings	8.50 to 9.50
Flashings	12.00 to 12.50
Low phos. plate scrap	13.75 to 14.25

## NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	\$12.50 to \$13.00
No. 2 hvy. mltng. steel	11.00 to 11.50
Hvy. breakable cast	14.00 to 14.50
No. 1 machinery cast	16.00 to 16.50
No. 2 cast	12.50 to 13.00
Stove plate	10.50 to 11.00
Steel car axles	19.00 to 20.00
Shafting	19.00 to 20.00
No. 1 RR. wrought	14.00 to 15.00
No. 1 wrought long	12.50 to 13.00
Spec. iron & steel pipe	13.50 to 14.00
Rails for rolling	15.50 to 16.00
Clean steel turnings	5.00
Cast borings	5.00 to 5.50
No. 1 blast furnace	5.00 to 5.50
Cast borings (chem.)	Nominal
Unprepared yard scrap	6.50 to 7.00
Light iron	4.50 to 5.00

Per gross ton delivered local foundries:

No. 1 machin. cast	\$17.00 to \$18.50
No. 2 cast	16.50 to 17.00

\* \$1.50 less for truck loads.

## BOSTON

Dealers' buying prices per gross ton:

Breakable cast	\$13.00 to \$13.25
Machine shop turn.	4.15
Mixed bor. & turn.	3.15
Bun. skeleton long	8.25
Shafting	17.00 to 17.25
Stove plate	9.75 to 10.00
Cast bor. chemical	8.00 to 8.50

Per gross ton delivered consumers' yards:

Textile cast	\$15.50 to \$17.00
No. 1 machine cast	15.50 to 17.00

Per gross ton delivered dealers' yards:

No. 1 hvy. mltng. steel	\$13.25
No. 2 steel	12.25

## PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	\$12.00	\$12.00	\$11.00
No. 2 hvy. mltng. steel	11.00	11.00	10.00
Bundles	10.00	10.00	9.00

## CANADA

Dealers' buying prices at these yards.

per gross ton		Toronto	Montreal
Low phos. steel	\$11.50	\$11.00	
No. 1 hvy. mltng. steel	11.00	10.50	
No. 2 hvy. mltng. steel	9.75	9.25	
Mixed dealers steel	8.75	8.25	
Drop forge flashings	9.75	9.25	
New loose clippings	8.75	8.25	
Busheling	6.00	5.50	
Scrap pipe	7.75	7.25	
Steel turnings	7.25	6.75	
Cast borings	6.75	6.25	
Machinery cast	18.00	17.00	
Dealers' cast	17.00	16.00	
Stove plate	12.50	12.00	

## EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel	\$15.00
No. 2 hvy. mltng. steel	14.00
Rail (scrap)	15.00
Stove plate	8.00 to 8.25

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel	\$15.50
No. 2 hvy. mltng. steel	14.50
Rail (scrap)	\$15.50 to 15.75
Stove plate	8.25 to 8.50

Philadelphia, delivered alongside boats,

Port Richmond	
No. 1 hvy. mltng. steel	\$16.00
No. 2 hvy. mltng. steel	14.75

# PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are effected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition.

## SEMI-FINISHED STEEL

**Billets, Blooms and Slabs**  
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Re-rolling only). Prices delivered Detroit are \$2 higher f.o.b. Duluth, billets only, \$2 higher.

*Per Gross Ton*  
Re-rolling ..... \$34.00  
Forging quality ..... 40.00

### Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.  
*Per Gross Ton*  
Open hearth or bessemer ..... \$34.00

### Skelp

Pittsburgh, Chicago Youngstown, Coatesville, Pa., Sparrows Point, Md.

*Per Lb.*  
Grooved, universal and sheared ..... 1.90c.

### Wire Rods

(No. 5 to 9/32 in.)  
*Per Lb.*  
Pittsburgh, Chicago or Cleveland ..... 2.00c.  
Worcester, Mass. .... 2.10c.  
Birmingham ..... 2.00c.  
San Francisco ..... 2.45c.  
Galveston ..... 2.25c.  
9/32 in. to 47/64 in. \$3 a net ton higher. Quantity extras apply.

## SOFT STEEL BARS

*Base per Lb.*  
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham 2.15c.  
Detroit, delivered ..... 2.25c.  
Duluth ..... 2.25c.  
Philadelphia, delivered.. 2.47c.  
New York ..... 2.49c.  
On cars dock Gulf ports 2.50c.  
On cars dock Pacific ports ..... 2.75c.

## RAIL STEEL BARS

(For merchant trade)  
Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham .... 2.05c.  
On cars dock Tex. Gulf ports ..... 2.40c.  
On cars dock Pacific ports ..... 2.65c.

## BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)  
Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt. .... 1.70c. to 1.90c.\*  
Detroit, delivered ..... 1.80c. to 2.00c.\*  
On cars dock Tex. Gulf ports ..... 2.20c. to 2.25c.\*  
On cars dock Pacific ports 2.20c. to 2.25c.\*

## RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)  
Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham. 1.70c. to 1.90c.\*  
Detroit, delivered ..... 1.80c. to 2.00c.\*  
On cars dock Tex. Gulf ports ..... 2.20c. to 2.25c.\*

## On cars dock

Pacific ports 2.20c. to 2.25c.\*  
\*The so-called published price on new billet reinforcing bars is 2.15c. a lb. f.o.b. major basing points and on rail reinforcing bars is 2.00c. a lb. The price range shown above, however, represents the going prices at the present time.

## IRON BARS

Chicago ..... 2.25c.  
Pittsburgh (refined) ... 3.75c.

## COLD FINISHED BARS AND SHAFTEING\*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary ..... 2.65c.  
Detroit ..... 2.70c.

\*In quantities of 20,000 to 39,999 lb.

## PLATES

*Base per Lb.*  
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del. .... 2.10c.  
Philadelphia, del'd .... 2.15c.  
New York, del'd ..... 2.29c.  
On cars dock Gulf ports 2.45c.  
On cars dock Pacific ports ..... 2.60c.  
Wrought iron plates, P'tg ..... 3.80c.

## FLOOR PLATES

Pittsburgh or Chicago. 3.35c.  
New York, del'd ..... 3.71c.  
On cars dock Gulf ports 3.70c.  
On cars dock Pacific ports ..... 3.95c.

## STRUCTURAL SHAPES

*Base per Lb.*  
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham.. 2.10c.  
Philadelphia, del'd .... 2.215c.  
New York, del'd ..... 2.27c.  
On cars dock Gulf ports 2.45c.  
On cars dock Pacific ports ..... 2.70c.

## STEEL SHEET PILING

*Base per Lb.*  
Pittsburgh, Chicago or Buffalo ..... 2.40c.  
On cars dock Gulf ports 2.85c.  
On cars dock Pacific ports ..... 2.90c.

## RAILS AND TRACK SUPPLIES

*F.o.b. Mill*  
Standard rails, heavier than 60 lb., per gross ton ..... \$40.00  
Angle bars, per 100 lb. 2.70

*F.o.b. Basing Points*  
Light rails (from billets) per gross ton... \$40.00  
Light rails (from rail steel) per gross ton.. 39.00

*Base per Lb.*  
Cut spikes ..... 3.00c.  
Screw spikes ..... 4.55c.  
Tie plates, steel ..... 2.15c.  
Tie plates, Pacific Coast ports ..... 2.25c.  
Track bolts, to steam railroads ..... 4.15c.  
Track bolts to jobbers, all sizes (per 100 counts) ..... 65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapolis, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

## SHEETS

### Hot Rolled

*Base per Lb.*  
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago 1.90c.  
Detroit, delivered ..... 2.00c.  
Philadelphia, delivered. 2.07c.  
Granite City ..... 2.00c.  
On cars dock Pacific ports ..... 2.40c.

### Cold Rolled\*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago ..... 2.85c.  
Detroit, delivered ..... 2.95c.  
Granite City ..... 2.35c.  
Philadelphia, delivered. 3.17c.  
On cars dock Pacific ports ..... 3.45c.

\*Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

### Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham ..... 3.50c.  
Philadelphia, del'd ..... 3.67c.  
Granite City ..... 3.60c.  
On cars dock Pacific ports ..... 4.00c.

### Electrical Sheets

(F.o.b. Pittsburgh)  
*Base per Lb.*  
Field grade ..... 3.20c.  
Armature ..... 3.55c.  
Electrical ..... 4.05c.  
Motor ..... 4.95c.  
Dynamo ..... 5.65c.  
Transformer 72 ..... 6.15c.  
Transformer 65 ..... 7.15c.  
Transformer 58 ..... 7.65c.  
Transformer 52 ..... 8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

### Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary ..... 3.60c.  
F.o.b. cars dock Pacific ports ..... 4.30c.

### Vitreous Enameling Stock, 20 Gage\*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland ..... 3.15c.  
Detroit, del'd ..... 3.25c.  
Granite City ..... 3.25c.  
On cars dock Pacific ports ..... 3.75c.

## TIN MILL PRODUCTS

### Tin Plate

*Per Base Box*  
Standard cokes, Pittsburgh, Chicago and Gary (100 lb.) ..... \$5.00  
Standard cokes, Granite City (100 lb.) ..... 5.10

### Special Coated Manufacturing Ternes

*Per Base Box*  
Granite City ..... \$4.40  
Pittsburgh or Gary ... 4.30

## Roofing Terne Plate (F.o.b. Pittsburgh per Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating		
I.C. ....	\$6.00	\$12.00
15-lb. coating		
I.C. ....	7.00	14.00
20-lb. coating		
I.C. ....	7.50	15.00
25-lb. coating		
I.C. ....	8.00	16.00
30-lb. coating		
I.C. ....	8.63	17.25
40-lb. coating		
I.C. ....	9.75	19.50

**Black Plate, 29 gage and lighter\***  
Pittsburgh, Chicago and Gary ..... 3.05c.  
Granite City ..... 3.15c.  
On cars dock Pacific ports, boxed ..... 4.00c.  
\*Black plate base price applies to 29 gage within certain width and length limitations.

## HOT ROLLED STRIP

(Widths up to 12 in.)  
*Base per Lb.*  
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham 1.90c.  
Detroit, delivered ..... 2.00c.  
On cars dock Pacific ports ..... 2.50c.

### Cooperage Stock

Pittsburgh and Chicago 2.00c.

## COLD ROLLED STRIP\*

*Base per Lb.*  
Pittsburgh, Youngstown or Cleveland ..... 2.60c.  
Chicago ..... 2.70c.  
Detroit, delivered ..... 2.70c.  
Worcester ..... 2.80c.

\*Carbon 0.25 and less.

### Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland ..... 2.75c.  
Detroit, del'd ..... 2.85c.  
Worcester ..... 3.15c.

## COLD ROLLED SPRING STEEL

	Pittsburgh and Cleveland	Worcester
Carbon 0.26-0.50%	2.60c.	2.80c.
Carbon 0.51-0.75	4.30c.	4.50c.
Carbon 0.76-1.00	6.15c.	6.35c.
Carbon 1.01-1.25	8.35c.	8.55c.

## WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

*To Manufacturing Trade*  
*Per Lb.*  
Bright wire ..... 2.60c.  
Galvanized wire, base .. 2.60c.  
Spring wire ..... 3.20c.

*To the Trade*  
*Base per Keg*  
Standard wire nails .... \$2.55  
Coated nails ..... 2.55  
Cut nails, carloads ..... 3.85

*Base per 100 Lb.*  
Annealed fence wire .... \$3.05  
Woven wire fence, 15½ gage and heavier base col. .... 67  
Fence posts (carloads), base col. .... 69  
Single loop bale ties, base col. .... 56  
Galvanized barbed wire on 80-rod spools (carloads) base col. .... 70  
Twisted barbless wire, base col. .... 70  
Note: Birmingham base same on above items, except spring wire.



## STEEL AND WROUGHT IRON PIPE AND TUBING

**Welded Pipe**  
Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills  
F.o.b. Pittsburgh only on wrought iron pipe.

In.	Black Galv.
1/2	56 36
3/4	59 43 1/2
1	63 1/2 54
1 1/4	66 1/2 58
1 1/2	68 1/2 60 1/2

In.	Black Galv.
1/2 & 3/4	+9 +30
1	24 6 1/2
1 1/4	30 13
1 1/2 & 1 3/4	34 19
1 3/4	38 21 1/2
2	37 1/2 21

In.	Black Galv.
1/2	56 36
3/4	59 43 1/2
1	63 1/2 54
1 1/4	66 1/2 58
1 1/2	68 1/2 60 1/2

In.	Black Galv.
1/2	56 36
3/4	59 43 1/2
1	63 1/2 54
1 1/4	66 1/2 58
1 1/2	68 1/2 60 1/2

In.	Black Galv.
1/2	56 36
3/4	59 43 1/2
1	63 1/2 54
1 1/4	66 1/2 58
1 1/2	68 1/2 60 1/2

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

**Boiler Tubes**  
Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall.

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

In.	Black Galv.
1/2	56 36
3/4	59 43 1/2
1	63 1/2 54
1 1/4	66 1/2 58
1 1/2	68 1/2 60 1/2

## CAST IRON WATER PIPE

In.	Black Galv.
1/2	56 36
3/4	59 43 1/2
1	63 1/2 54
1 1/4	66 1/2 58
1 1/2	68 1/2 60 1/2

4-in. f.o.b. dock, San Francisco or Los Angeles 59.00  
F.o.b. dock, Seattle 52.00

Class "A" and gas pipe, \$3 extra  
4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$45. Birmingham, and \$53.80 delivered Chicago.

## BOLTS, NUTS, RIVETS, SET SCREWS

**Bolts and Nuts**  
(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

In.	Black Galv.
1/2	56 36
3/4	59 43 1/2
1	63 1/2 54
1 1/4	66 1/2 58
1 1/2	68 1/2 60 1/2

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

In.	Black Galv.
1/2	56 36
3/4	59 43 1/2
1	63 1/2 54
1 1/4	66 1/2 58
1 1/2	68 1/2 60 1/2

On stove bolts freight is allowed up to 65% per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

**Large Rivets**  
(1/2 in. and larger)  
Base per 100 lb.

F.o.b. Pittsburgh, Cleveland Chicago, Birmingham 34.40

**Small Rivets**  
(7/16 in. and smaller)  
Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 65 and 10

**Cap and Set Screws**  
(Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.)

In.	Black Galv.
1/2	56 36
3/4	59 43 1/2
1	63 1/2 54
1 1/4	66 1/2 58
1 1/2	68 1/2 60 1/2

## Alloy Steel

**Alloy Steel Blooms, Billets and Slabs**  
F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.

Base price, \$56.00 a gross ton.

**Alloy Steel Bars**  
F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.  
Open-hearth grade, base 2.70c. Delivered, Detroit 2.80c.

S.A.E. Series	Alloy Differential per 100 Lb.
200 (1 1/2% Ni)	\$0.35
2100 (1 1/2% Ni)	0.75
2300 (3 1/2% Ni)	1.55
2500 (5% Ni)	2.25
31 Ni-Cr	0.70
3200 Ni-Cr	1.85
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
4340 Cr-Ni-Mo	1.65
4345 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.20 to 0.30 Mo. 1.50 to 2.00 Ni)	1.10
5100 Chrome steel (0.60-0.90 Cr)	0.35
5100 Chrome steel (0.80-1.10 Cr)	0.45
6100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base.

**Alloy Cold-Finished Bars**  
F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. base per lb. Delivered Detroit, 3.45c., carlots.

## STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

No.	No.	No.	No.
302	304	304	304
Forging billets	21.25c.	20.40c.	
Bars	25c.	24c.	
Plates	29c.	27c.	
Structural shapes	25c.	24c.	
Sheets	36c.	34c.	
Hot-rolled strip	23.50c.	21.50c.	
Cold-rolled strip	30c.	28c.	
Drawn wire	25c.	24c.	

No.	No.	No.	No.
410	430	442	446
Bars	18.50c.	19c.	22.50c. 27.50c.
Plates	21.50c.	22c.	25.50c. 30.50c.
Sheets	26.50c.	29c.	32.50c. 36.50c.
Hot strip	17c.	17.50c.	24c. 35c.
Cold strip	22c.	22.50c.	32c. 52c.

**TOOL STEEL**  
High speed 67c.  
High-carbon-chrome 43c.  
Oil-hardening 24c.  
Special 22c.  
Extra 18c.  
Regular 14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

## PIG IRON AND FERROALLOYS

No.	No.	No.	No.
2	2	2	2
F.o.b. Everett, Mass.	\$24.00		
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	24.00		
Delivered Brooklyn	26.50		
Delivered Newark or Jersey City	25.53		
Delivered Philadelphia	24.84		
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	23.00		
F.o.b. Buffalo	23.00		
F.o.b. Detroit	23.00		
Southern, del'd. Cincinnati	23.06		
Northern, del'd. Cincinnati	23.44		
F.o.b. Duluth	23.50		
F.o.b. Provo, Utah	21.00		
Delivered, San Francisco, Los Angeles or Seattle	26.50		
F.o.b. Birmingham*	19.38		

\* Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over.

**Malleable**  
Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

No.	No.	No.	No.
2	2	2	2
F.o.b. Everett, Mass.	\$23.50		
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	23.50		
F.o.b. Buffalo	22.00		
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	22.50		
Delivered Philadelphia	24.34		
Delivered Canton, Ohio	23.89		
Delivered Mansfield, Ohio	24.44		
F.o.b. Birmingham	18.00		

**Bessemer**  
F.o.b. Buffalo 24.00  
F.o.b. Everett, Mass. 25.00  
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa. 25.00

No.	No.	No.	No.
2	2	2	2
Delivered Newark or Jersey City	26.53		
Erie, Pa., and Duluth	24.00		
F.o.b. Neville Island, Toledo, Chicago and Youngstown	23.50		
F.o.b. Birmingham	24.00		
Delivered Cincinnati	24.11		
Delivered Canton, Ohio	24.83		
Delivered Mansfield, Ohio	25.44		

**Low Phosphorus**  
Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo \$28.50

**Gray Forge**  
Valley or Pittsburgh furnace \$22.50

**Charcoal**  
Lake Superior furnace \$27.00  
Delivered Chicago 30.34

**Canadian Pig Iron**  
Per Gross Ton  
Montreal  
Foundry iron 27.50 base  
Malleable 28.00 base  
Basic 27.50 base

**Toronto**  
Foundry iron 25.50 base  
Malleable 26.00 base  
Basic 25.50 base  
On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

**Ferromanganese**  
F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton  
Domestic, 80% (carload) \$100.00

**Spiegeleisen**  
Per Gross Ton Furnace  
Domestic, 19 to 21% \$32.00  
Domestic, 26 to 28% 39.50

**Electric Ferrosilicon**  
Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk) \$69.50\*  
50% (ton lots, packed) 82.00\*  
75% (carload lots, bulk) 126.00\*  
75% (ton lots, packed) 142.00\*

**Bessemer Ferrosilicon**  
F.o.b. Furnace, Jackson, Ohio

Per Gross Ton  
10.00 to 10.50% \$32.50  
For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.



For each unit of manganese over 2%, \$1 per ton additional.  
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

#### Silvery Iron

*Per Gross Ton*  
F.o.b. Jackson, Ohio, 5.00  
to 5.50% .....\$27.50  
For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.  
Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

#### Ferrochrome

*Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract*

4 to 6% carbon .....11.00c.  
2% carbon .....17.50c.  
1% carbon .....18.50c.  
0.10% carbon .....20.50c.  
0.06% carbon .....21.00c.  
Spot prices are 1/4c. per lb. of contained chromium higher.

#### Silico-Manganese

*Per Gross Ton, Delivered, Lump Size, Bulk, on Contract*

3% carbon .....\$98.00\*  
2.50% carbon .....103.00\*  
2% carbon .....108.00\*  
1% carbon .....118.00\*

#### Other Ferroalloys

Ferrotungsten, per lb. contained W. del. carload .....\$2.00  
Ferrotungsten, 100 lb. and less .....2.25  
Ferrovandium, contract, per lb. contained V., del'd \$2.70 to \$2.90†  
Ferracolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots .....\$2.25†  
Ferrocobaltititanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton .....\$142.50  
Ferrocobaltititanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton .....\$157.50  
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton .....\$58.50  
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville .....\$75.00

Ferromolybdenum, per lb. Mo f.o.b. furnace 95c.  
Calcium molybdate, per lb. Mo f.o.b. furnace 80c.  
Molybdenum oxide briquettes 48-52% Mo per lb. contained Mo f.o.b. Langeloth, Pa. .... 80c.

\*Spot prices are \$5 per ton higher.  
†Spot prices are 10c. per lb. of contained element higher.

#### \*ORES

##### Lake Superior Ores

*Delivered Lower Lake Ports Per Gross Ton*  
Old range, bessemer, 51.50% .....\$5.25  
Old range, non-bessemer, 51.50% .....5.10  
Mesaba, bessemer, 51.50% 5.10  
Mesaba, non-bessemer, 51.50% .....4.95  
High phosphorus, 51.50% 4.85

##### Foreign Ores\*

*C.i.f. Philadelphia or Baltimore, Exclusive of Duty Per Unit*  
Algerian, low P, Cu free, dry, 55 to 58% Fe .....14c.  
Caucasian, washed, 52% Mn .....50c.  
African, Indian, 44 to 48% Mn .....46c.  
African, Indian, 49 to 51% Mn .....49c.  
Brazilian, 46 to 48% Mn. 47c.  
Cuban, del'd, duty free, 51% Mn .....62c.  
*Per Short Ton Unit*  
Tungsten, Chinese, Wolframite, duty paid, delivered .....\$23.00 to \$23.50  
Tungsten, domestic scheelite del'd .....23.00 to 23.50  
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade) .....\$19.00  
Rhodesian, 45% .....22.00  
Rhodesian, 48% 26.00 to 27.00

\*All foreign ore prices are nominal. War conditions have prevented trading in Swedish and Turkish ores and all quotations have therefore been withdrawn.

#### FLUORSPAR

*Per Net Ton*  
Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail .....\$21.00  
Domestic, f.o.b. Ohio River landing barges .....21.00  
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines .....\$20.00 to 22.00

Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid \$25.00 to \$25.50

Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines .....\$31.00  
ditto, in bags, f.o.b. same mines .....\$32.60

#### FUEL OIL

*Per Gal.*  
No. 3, f.o.b. Bayonne, N. J. ....5.10c.  
No. 6, f.o.b. Bayonne, N. J. ....3.57c.  
No. 5 Bur. Stds., del'd Chicago .....3.25c.  
No. 6 Bur. Stds., del'd Chicago .....2.75c.  
No. 3 distillate, del'd Cleveland .....5.25c.  
No. 4 industrial, del'd Cleveland .....5.00c.  
No. 5 industrial, del'd Cleveland .....3.75c.  
No. 6 industrial, del'd Cleveland .....3.25c.

#### COKE

*Per Net Ton*  
Furnace, f.o.b. Connellsville, Prompt .....\$4.00 to \$4.25  
Foundry, f.o.b. Connellsville, Prompt .....\$5.25 to \$5.50  
Foundry, by-product Chicago ovens .....\$10.50  
Foundry, by-product delivered New England .....\$12.50  
Foundry, by-product delivered Newark or Jersey City, .....\$11.38 to \$11.90  
Foundry, by-product Philadelphia .....\$11.13  
Foundry, by-product delivered Cleveland .....\$11.05  
Foundry, by-product delivered Cincinnati .....\$10.50  
Foundry, Birmingham .....\$7.50  
Foundry, by-product delivered St. Louis industrial district .....\$10.75 to \$11.00  
Foundry, from Birmingham, f.o.b. cars dock Pacific ports .....\$14.75

#### REFRACTORIES PRICES

*Fire Clay Brick Per 1000 f.o.b. Works*  
Super-duty brick, at St. Louis .....\$60.80  
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois .....47.50  
First quality, New Jersey 52.50  
Second quality, Pennsylvania, Maryland, Ken-

tucky, Missouri and Illinois .....42.75  
Second quality, New Jersey .....49.00  
No. 1 Ohio .....39.90  
Ground fire clay, per ton 7.10

#### Silica Brick

*Per 1000 f.o.b. Works*  
Pennsylvania .....\$47.50  
Chicago District .....55.10  
Birmingham .....47.50  
Silica cement per net ton (Eastern) .....8.55

#### Chrome Brick

*Net per Ton*  
Standard f.o.b. Baltimore, Plymouth Meeting and Chester .....\$50.00  
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa. ....50.00

#### Magnesite Brick

*Net per Ton*  
Standard f.o.b. Baltimore and Chester .....\$72.00  
Chemically bonded, f.o.b. Baltimore .....61.00

#### Grain Magnesite

*Net per Ton*  
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks) .....(—)\*  
Domestic, f.o.b. Baltimore and Chester in sacks .....40.00  
Domestic, f.o.b. Chewelah, Wash. (in bulk) ..22.00

\*None available.

#### British and Continental BRITISH

*Per Gross Ton*  
f.o.b. United Kingdom Ports  
Ferromanganese, export .....£17 18s.  
Tin plate, per base box .....32s. to 33s.  
Steel bars, open hearth .....13£ 9s.  
Beams, open hearth .....12£ 2s. 6d.  
Channels, open hearth .....12£ 2s. 6d.  
Angles, open hearth .....12£ 2s. 6d.  
Black sheets, No. 24 gage 17£ max.\*; 17£ min.\*\*  
Galvanized sheets, No. 24 gage 19£ 10s. max.\*; 19£ 10s. min.\*\*

\*Empire markets only.  
\*\*Other than Empire markets.

#### CONTINENTAL

*Per Gross Ton, Belgian Francs f.o.b. Continental Ports*  
Bars, merchant .....1500  
Plates .....1750  
Joists .....1475  
Sheets, thin .....1900

Above prices are minimum base to which 100 francs should be added to cover war risk insurance, freight charges, etc.

## WAREHOUSE PRICES

Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	St. Louis	St. Paul	Milwaukee
Sheets, hot rolled	\$3.35	\$3.35	\$3.35	\$3.55	\$3.58	\$3.42	\$3.35	\$3.71	\$3.38	\$3.60	\$3.48
Sheets, cold rolled	4.75	4.30	4.05	4.55	4.60	4.50	4.55	4.78	4.32	4.95	4.43
Sheets, galv.	4.75	4.60	4.72	5.00	4.50	4.84	4.45	4.86	4.95	5.00	4.98
Strip, hot rolled	3.60	3.60	3.50	3.85	3.96	3.68	3.82	4.06	3.72	3.82	3.73
Strip, cold rolled	3.20	3.50	3.20	3.51	3.51	3.40	3.42	3.46	3.61	3.80	3.54
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.47	3.80	3.68
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.47	3.80	3.68
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.62	3.75	3.88
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.02	4.34	3.88
Bars, hot rolled SAE 2300	7.20	7.10	7.30	7.31	7.35	7.42	7.10	7.50	7.47	7.45	7.33
Bars, hot rolled SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	6.02	6.00	5.88
Bars, cold drawn SAE 2300	8.15	8.15	8.15	8.56	8.59	8.85	8.15	8.63	8.52	8.84	8.38
Bars, cold drawn SAE 3100	6.75	6.75	6.75	7.16	7.19	7.45	6.75	7.23	7.12	7.44	6.98

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, less than 1500 lb.; cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb.; galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb.; galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb.; galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb.; galvanized sheets, any quantity, cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb. Extras for size, quality, etc., apply on above quotations.

# ...NON-FERROUS...

... Market turns quiet after several days of active buying ... Lead advanced \$2 a ton ... Export copper demand improves ... Refined copper stocks rise to 159,795 tons.

NEW YORK, April 16—The sudden improvement in domestic demand for non-ferrous metals, noted here a week ago, was as short-lived as it was intense. On Tuesday and Wednesday of last week considerable tonnages of all metals were purchased, but over the remainder of the week buying interest slowly petered out and today all markets were reported very quiet. The heavy demand for copper resulted in both the custom smelters' and open

market prices advancing, on Wednesday, to the producer-level of 11.50c. per lb., for electrolytic metal, Valley delivery. Previously concessions of from 1/8c. to 1/4c. were available in the open market and from custom smelters. Producers' sales for the month through Saturday amounted to about 22,200 tons, as compared with 11,300 tons in the like period of the previous month. Export buyers were also more active during the week and considerable tonnages changed

hands at 11.50c., f.a.s., for spot metal. Forward positions were offered for export at 11.375c. Deliveries of copper to domestic consumers gained 1161 tons in March, but export shipments declined 2077 tons, causing a net loss of 916 tons to 71,893 tons for the month's total shipments. This figure is the lowest reported so far this year, but is substantially above the 55,025 tons shipped in March, 1939. Both crude and refined production in March showed increases over the previous month, causing stocks to advance to 159,795 tons, as compared with 145,393 at the close of February. A year ago stocks were 320,812 tons.

## Lead

Buying in the past week, in sympathy with general non-ferrous market sentiment, was very heavy and prices were advanced on Wednesday \$2 a ton to 5.10c. per lb., New York. So far in the current week, buying has been of fill-in character and it is likely that the market is in for an extended period of this type of buying in view of the heavy commitments made over the past two weeks. It is estimated that over the course of the past 10 market days consumers have covered on close to a month's supply of lead so that April at present is very nearly completely covered and May about 40 per cent bought.

## Zinc

Prime Western sales in the past week shot up to 19,600 tons from 140 tons in the preceding week. Shipments, however, were off slightly to 2882 tons from 3028 tons. The buying was widely diversified as to consuming channels and the positions sought ran from April through July. The price weakness in evidence previous to the past Tuesday was completely eliminated in the buying wave. Although the crest of the buying movement has apparently passed and the market is currently quiet, the present quotation of 6.14c. per lb., New York, appears firm.

## Tin

An active, well diversified demand for April-May deliveries was experienced last Tuesday and Wednesday, but sales volume over the balance of the week was spasmodic, varying with the day-to-day trends in foreign development. Prices rose to a high of 47.50c. per lb., New York, for Straits on Thursday, but dropped back to 46.50c. on Monday. Today's quotations were slightly stronger, but trading was very light. Cash standards in London today were priced at £253 10s., a gain of £3 5s. over a week ago.

## NON-FERROUS PRICES

Cents per lb. for early delivery

	Apr. 10	Apr. 11	Apr. 12	Apr. 13	Apr. 15	Apr. 16
*Copper, Electrolytic <sup>1</sup>	11.50	11.50	11.50	11.50	11.50	11.50
Copper, Lake	11.50	11.50	11.50	11.50	11.50	11.50
Tin, Straits, New York	47.375	47.50	47.25	....	46.50	47.25
Zinc, East St. Louis <sup>2</sup>	5.75	5.75	5.75	5.75	5.75	5.75
Lead, St. Louis <sup>3</sup>	4.95	4.95	4.95	4.95	4.95	4.95

\* Mine producers' quotations only.

<sup>1</sup> Delivered Conn. Valley. Deduct 1/4c. for New York delivery. <sup>2</sup> Add 0.39c. for New York delivery. <sup>3</sup> Add 0.15c. for New York delivery.

## Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits, pig	48.00c.	47.75c.
Copper, Lake	13.25c.	12.625c.
Copper, electro	12.75c.	12.625c.
Copper, castings	12.375c.	12.375c.
*Copper sheets, hot-rolled	20.12c.	20.12c.
*Yellow brass sheets	18.31c.	18.31c.
*Seamless brass tubes	21.06c.	21.06c.
*Seamless copper tubes	20.62c.	20.62c.
*Yellow brass rods	14.26c.	14.26c.
Zinc slabs	7.10c.	7.75c.
Zinc sheets, No. 9 casks	12.00c.	13.35c.
Lead, American pig	6.10c.	5.50c.
Lead, bar	8.05c.	8.25c.
Lead, sheets, cut	8.25c.	8.25c.
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per cent plus	20.50c.	21.50c.
Alum., No. 1 remelt., 98 to 99 per cent	18.00c.	18.50c.
Solder, 1/2 and 1/2	29.80c.	29.00c.
Babbitt metal, anti-friction grade	19.85c.	19.00c.

\*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/4; on brass sheets and rods, 40; on brass tubes, 33 1/4, and copper tubes, 40.

## Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	9.25c.	9.875c.
Copper, hvy. and wire	8.25c.	8.625c.
Copper, light and bottoms	7.25c.	7.75c.
Brass, heavy	5.00c.	5.50c.
Brass, light	4.125c.	4.875c.
Heavy machine composition	7.75c.	8.375c.
No. 1 yel. brass turnings	4.75c.	5.75c.
No. 1 red brass or composition turnings	7.25c.	8.75c.
Lead, heavy	4.00c.	4.375c.
Cast aluminum	7.75c.	8.75c.
Sheet aluminum	13.00c.	14.00c.
Zinc	3.00c.	3.75c.

## Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 19c.-20c. a lb.; No. 12 remelt No. 2 standard, 18c.-19c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICK-SILVER, \$178-\$179 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 11.75c. a lb.

## REINFORCING STEEL

... Awards of 10,500 tons; 4800 tons in new projects

### AWARDS

#### ATLANTIC STATES

- 200 Tons, Harrisburg, Pa., George A. Hoverter housing, to Bethlehem Steel Co., Bethlehem, Pa., through Berwick Lumber & Supply Co., contractor.
- 150 Tons, Buffalo, store, Sattler's, Inc., to Truscon Steel Co., Youngstown, through Siegfried Construction Co.
- 150 Tons, Northampton, Mass., pumping station, to Truscon Steel Co.; J. G. Roy & Sons, Springfield, Mass., contractors.
- 130 Tons, Dunkirk, N. Y., grade elimination project, to Bethlehem Steel Co., Bethlehem, Pa., through C. B. Moon Co., contractor.
- 128 Tons, New York, seaplane hangar at Floyd Bennett Field, to Bethlehem Steel Co., Bethlehem, Pa.
- 125 Tons, Cumberland County, Pa., highway project, to Bethlehem Steel Co., Bethlehem, Pa., through Walker Bros., Chambersburg, Pa.
- 120 Tons, Glenbrook, Conn., Phillips Chemical Co. building, to Bethlehem Steel Co., Bethlehem, Pa., through Samworth-Hughes Co., Paterson, N. J., contractor.
- 115 Tons, Oak, Pa., building, Goodrich Tire & Rubber Co., to Bethlehem Steel Co., Bethlehem, Pa.

#### SOUTH AND CENTRAL

- 520 Tons, Franklin and Madison Counties, Ohio, project No. 23, to Ben Tom Supply Co., Columbus, through Robert J. Dienst, Columbus.
- 380 Tons, Lexington, Ky., public health service hospital, to West Virginia Rail Co., through Fleisher Engineering & Construction Co., contractors.
- 260 Tons, Bristol, Tenn.-Va., housing project, to Knoxville Iron Works, Knoxville, Tenn., through C. L. Nickolson Co.
- 250 Tons, Cleveland, for city, to Patterson-Leitch Co., Cleveland.
- 200 Tons, Omaha, Neb., Logan-Fontanelle housing, to Sheffield Steel Corp., Kansas City.
- 125 Tons, Columbia, Mo., dormitory, Stephens College, to Laclede Steel Co., St. Louis, through John Epple Construction Co., Columbia.
- 124 Tons, Minneapolis, Treasury Department letting, to Youngstown Sheet & Tube Co., Youngstown.
- 110 Tons, Detroit, city project, divided between Great Lakes Steel Corp., Detroit, and Republic Steel Corp., Cleveland.
- 100 Tons, Cleveland, plant foundation for Illuminating Co. to Patterson-Leitch Co., Cleveland, through Hunkin-Conkey Co., Cleveland.

#### WESTERN STATES

- 345 Tons, Oleum Cal. steam plant for Pacific Gas & Electric Co., to Gilmore Fabricators, Inc., San Francisco, through MacDonald & Kahn, Ltd., San Francisco, contractor.
- 300 Tons, Alameda, Cal., bachelor officers' quarters at Navy air base (Specifications 3176), to Herrick Iron Works, Oakland, Cal., through M. H. Golden, San Diego, Cal., contractor.
- 242 Tons, Tigard, Ore., grade separation and Fanno Creek bridge, to Truscon Steel Co., Portland, Ore., through Jacobsen-Jensen Co., Portland, contractor.
- 118 Tons, Lincoln County, Ore., remodeling bridge over Depoe Bay, to Mercer Steel Co., Portland, Ore., through Odom Construction Co., Oregon City, Ore., contractor.

#### CANAL ZONE

- 4900 Tons, Panama Canal, officers' quarters, Pacific sector, contracts 1 and 3, to Bethlehem Steel Co., Bethlehem, Pa., through Tucker McClure, contractor.
- 1400 Tons, Panama Canal, officers' quarters, Atlantic sector, to Carnegie-Illinois Steel Corp., Pittsburgh, through J. A. Jones Construction Co.

### PENDING REINFORCING BAR PROJECTS

#### ATLANTIC STATES

- 550 Tons, Willowbrook, Staten Island, hospital, new bids taken April 17.
- 290 Tons, Somersfield, Pa., flood control dam, Youghiogheny River.
- 250 Tons, Rochester, Sears, Roebuck & Co. building.

- 200 Tons, New York, 11th Avenue viaduct; bids taken April 16.
- 200 Tons, Queens, N. Y., sewer, Tomasetti Construction Co., contractor.
- 100 Tons, Lancaster, Pa., Armstrong Cork Co. building.
- 100 Tons, Baltimore, Herring Run bridge.

#### SOUTH AND CENTRAL

- 750 Tons, Piedmont, Mo., Clearwater Dam; bids April 23.
- 375 Tons, Lexington, Ky., public health building.
- 305 Tons, Lexington, Ky., housing project.
- 300 Tons, Kansas City, Mo., Grand Avenue viaduct; bids April 30.
- 152 Tons, Cedar Rapids, Iowa, cold storage building; bids in.
- 150 Tons, Speedway, Ind., Allison division, General Motors Corp.
- 130 Tons, Detroit, Sears, Roebuck & Co.
- 120 Tons, Flint, Mich., train shed, Fisher Body plant, General Motors Corp.
- Unstated Tonnage, Milwaukee, Sears, Roebuck & Co., store.

#### WESTERN STATES

- 1267 Tons, Odair, Wash., Grand Coulee Dam (Invitation B-38232-A); bids April 18.
- 268 Tons, Banning, Cal., highway work; bids May 2.

## CAST IRON PIPE

Marblehead, Mass., has awarded 2800 ft. of 8-in. pipe to Warren Foundry & Pipe Corp.

Wakefield, Mass., has awarded various sized pipe to United States Pipe & Foundry Co. without competition. Town has borrowed \$50,000 to pay for the pipe.

Woonsocket, R. I., has awarded its 1940 pipe and fittings requirements to Warren Foundry & Pipe Corp.

Lynnfield, Mass., will be in the market soon for a standpipe, pumping station and cast iron pipe. John S. Caldwell is chairman of Water Board. Whitman & Howard, 80 Broad Street, Boston, are engineers.

Shirley Village, Mass., will ask bids soon for 6, 8 and 10-in. pipe, standpipe and pumping station. Project will cost about \$100,000. Howard Bailey, 177 State Street, Boston, is engineer.

Board of Public Works, Princeton, Ind., plans pipe line extensions and replacements in water system to cost about \$190,000. This will be part of general waterworks improvement program, to include purification plant equipment, cost about \$27,000; pumping machinery and accessories, over \$25,000; service pipe lines, about \$32,500; meter installations, \$27,450 and other work. It is proposed to purchase present system from private company and take over at early date. Special election is being arranged May 3 to approve project. Lewis Finch, Century Building, Indianapolis, is consulting engineer.

Water Bureau, Nashville, Tenn., will complete plans in 60 to 90 days for pipe lines and other facilities for industrial water supply in suburban utility district. Cost about \$900,000 complete. Freeland, Roberts & Co., Third National Bank Building, are consulting engineers.

Saukville, Wis., has approved water system financing for \$65,000 at special election, including pipe lines and other equipment. Fund will be arranged through Federal aid. A. E. McMahon Engineering Co., Menasha, Wis., is consulting engineer.

Colton, S. D., closes bids April 22 for about 4500 ft. of 6 and 4-in. pipe for water system; also for elevated steel tank and tower, gate valves, fire hydrants and other equipment. Dakota Engineering Co., Western Building, Mitchell, S. D., is consulting engineer.

California-Oregon Power Co., Grants Pass, Ore., plans about 5100 ft. of 12-in. pipe for main water line at Klamath Falls, Ore. Cost about \$30,000. This is part of company 1940 water system expansion program.

Pageland, S. C., asks bids until April 23 for pipe lines for water system extensions; also for 100,000-gal. water storage reservoir, filtration plant, pumping station with two 125 gal. per min. pumping units and accessories, and other waterworks installation. Tomlinson Engineering Co., 1226 Sumter Street, Columbia, S. C., is consulting engineer.

Spokane, Wash., will take bids April 18 on 245 tons of 4 and 6-in. pipe.

Los Angeles Department of Water and Power opened bids April 8 on 40,000 ft. of 8-in. pipe on which National Cast Iron Pipe Co. is low on 30,000 ft. and American Cast Iron Pipe Co. low on 10,000 ft.

Chase, Kan., will take bids soon for pipe for water system and other waterworks installation, including elevated steel tank and tower, pumping station, etc. Cost close to \$35,000. Bids recently received have been rejected. Paulette & Wilson, 1006 Kansas Avenue, Topeka, Kan., and Public Utility Building, Salina, Kan., are consulting engineers.

Grand Junction, Colo., has approved plans for extensions in water pipe lines in new municipal district, recently created. Cost about \$35,900. Financing has been arranged through Federal aid.

Metzger Water District, near Portland, Ore., care of C. E. Carter, Spalding Building, Portland, engineer, plans pipe line extensions and replacements in water system and other waterworks installation. Cost about \$93,000. Bond issue of \$26,000 has been approved and remainder of fund will be secured through Federal aid.

Houston, Tex., plans pipe line extensions in water system and other waterworks installation, including fire hydrants, etc. Cost about \$132,700, of which about \$45,000 will be furnished by city and remainder secured through Federal aid.

Beach Haven, N. J., plans 12 and 16-in. pipe for main lines for water system in several streets. Fund of about \$35,000 is being arranged for this and other waterworks installation.

Salisbury, N. C., plans pipe lines for water system and other waterworks installation. Fund of about \$144,000 is being arranged for this and sewage system, of which about \$44,000 will be furnished by municipality and remainder secured through Federal aid. Paul M. Van Camp, Southern Pines, N. C., is consulting engineer.

Schofield, Wis., has voted for water and sewer systems; waterworks to cost village \$65,000, and sewer system \$40,000. Total cost is estimated at \$319,000, of which \$214,000 has been arranged through Federal aid. Construction costs will be paid partly by two \$10,000 issues in general obligation bonds which, with \$55,000 in revenue bonds, were also approved at election.

Spencer, Wis., favored a referendum at April 2 election calling for construction of a \$65,000 water system, WPA to provide labor and some materials as part of project.

Cle Elum, Wash., has awarded 305 tons of cast iron pipe to Pacific Water Works Supply Co., Seattle. Remainder of inquiry will employ concrete pipe.

Pasadena, Cal., has awarded 500 tons of 4, 6, 8, and 12-in. pipe to United States Pipe & Foundry Co., San Francisco.

## Harbison-Walker Buys Plant in Texas

PITTSBURGH—Harbison-Walker Refractories Co. has purchased the plant of the Athens Brick & Tile Co., Athens, Tex. W. B. Coullie of the former company's sales department has been made vice-president and H. S. Robertson succeeds Mr. Coullie as general sales manager. According to Raymond Willey, president of Harbison-Walker, the company's business has fallen off considerably in the first quarter of 1940 when compared with the last quarter of 1939 but the last two weeks have reflected improved business.



# FABRICATED STEEL

... Lettings advance to 9950 tons from 5450 tons last week  
... New projects slightly lower at 16,600 tons ... Plate awards total 4105 tons.

## AWARDS

### NORTH ATLANTIC STATES

- 650 Tons, Millville, N. J., furnace building for Armstrong Cork Co., to Bethlehem Steel Co., Bethlehem, Pa.
- 570 Tons, Cheektowaga, N. Y., State bridge PSC-4666, to Bethlehem Steel Co., Bethlehem, Pa.
- 460 Tons, Southport, Conn., five bridges for New York, New Haven & Hartford Railroad, to American Bridge Co., Pittsburgh.
- 330 Tons, Queens, N. Y., vehicular underpass, Bush Street, to American Bridge Co., Pittsburgh.
- 120 Tons, Lackawanna, N. Y., State bridge PSC-5386, to Bethlehem Steel Co., Bethlehem, Pa.

### THE SOUTH

- 450 Tons, Louisville, Ky., factory building for Kentucky Macaroni Co., to Bethlehem Steel Co., Bethlehem, Pa.
- 422 Tons, State of Texas, highway bridges, to Virginia Bridge Co., Roanoke, Va., and Mosher Steel Co., Dallas, Tex.
- 150 Tons, Louisville, Ky., scientific school for University of Louisville, to Louisville Bridge & Iron Co., Louisville.
- 120 Tons, Charleston, W. Va., alterations to store building for Montgomery Ward & Co., to Ingalls Iron Works Co., Birmingham.

### CENTRAL STATES

- 2500 Tons, Cincinnati, foundry buildings for Cincinnati Milling Machine Co., to Bethlehem Steel Co., Bethlehem, Pa., through Austin Co., Cleveland.
- 700 Tons, St. Paul, Minn., post office addition, to Lakeside Bridge & Steel Co., Milwaukee.
- 650 Tons, Indianapolis, plant expansion for Allison Engineering Division, General Motors Corp., to Central States Bridge Co., Indianapolis.
- 360 Tons, Cleveland, addition to Warner & Swasey Co. plant, to Patterson-Leitch Co., Cleveland.
- 350 Tons, Toledo, chemical building for city, to Bethlehem Steel Co., Bethlehem, Pa.
- 270 Tons, Toledo, Ohio, high and low pumping stations, to Ingalls Iron Works Co., Birmingham, through A. Bentley & Sons.
- 230 Tons, Detroit, theater building for Royal Theatre Co., to Whitehead & Kales Co., Detroit.
- 200 Tons, Wyandotte, Mich., store building for Sears, Roebuck & Co., to Whitehead & Kales Co., Detroit.
- 200 Tons, Pinckneyville, Ill., State bridge 152, section 104-SF, to American Bridge Co., Pittsburgh.
- 120 Tons, Belvue, Kan., bridge No. 100.87 for Union Pacific Railroad, to American Bridge Co., Pittsburgh.
- 114 Tons, Cleveland, Union Gospel Press addition, to Fort Pitt Bridge Works Co., Massillon, Ohio, through Woide Construction Co.
- 109 Tons, Chicago, subway section S-9-A, to American Bridge Co., Pittsburgh.

### WESTERN STATES

- 565 Tons, Gibbon, Wash., viaduct for Northern Pacific Railway, to American Bridge Co., Pittsburgh.
- 150 Tons, Meeteetse, Wyo., bridges on Meeteetse-Thermopolis road, to Des Moines Steel Co., Des Moines, Iowa, through Wyoming Construction Co., Laramie, Wyo., contractor.
- 150 Tons, Earp, Cal., 200-ton crane for Parker power plant (Specifications 1329-D), to Cyclops Iron Works, San Francisco.

## PENDING STRUCTURAL PROJECTS

### NORTH ATLANTIC STATES

- 3500 Tons, New York, Benjamin Franklin High School, 116th Street and East River Drive.
- 2300 Tons, New York, Eastchester Creek bridge superstructure for Triborough Bridge Authority.

- 2000 Tons, New York, public school No. 99 in Bronx; bids May 1.
- 1000 Tons, New York, parochial school, 153rd Street and Grand Concourse.
- 750 Tons, Jamaica, N. Y., parochial school.
- 400 Tons, Massena, N. Y., extension to melting building for Aluminum Co. of America.
- 400 Tons, Morris County, N. J., State bridge.
- 400 Tons, Atlantic City, N. J., power house extension for Atlantic City Electric Co.
- 200 Tons, Hartford, Conn., National Fire Insurance Co. building; George A. Fuller, contractor.
- 170 Tons, Malden, Mass., store building for F. W. Woolworth Co.
- 150 Tons, Dunkirk, N. Y., building extension for Allegheny-Ludlum Steel Corp.
- 120 Tons, Camillus, N. Y., building for Camillus Cutlery Co.

### SOUTH AND SOUTHWEST

- 253 Tons, Colfax County, N. M., overpass on Route 85-87; Skousen Brothers, Albuquerque, N. M., contractor.
- 130 Tons, St. Augustine, Fla., trestle over San Sebastian River for Florida East Coast Railway.

### CENTRAL STATES

- 750 Tons, Kansas City, Mo., Grand Avenue viaduct; bids April 30.
- 270 Tons, Cincinnati, Winton Terrace apartment building for Cincinnati Metropolitan Housing Authority.
- 180 Tons, Wellman, Iowa, State bridge.
- 160 Tons, State of Illinois, highway projects; bids April 19.
- 160 Tons, Piedmont, Mo., Clearwater Dam; bids April 23.
- 150 Tons, Chicago, substructure for State Street bridge; bids April 24.

### WESTERN STATES

- 1350 Tons, Oakland, Cal., Loose-Wiles Biscuit Co. plant; bids April 27.
- 700 Tons, Dever, building for National Biscuit Co.
- 475 Tons, Loveland, Colo., tunnel ribs, Specification 902, for Bureau of Reclamation.
- 360 Tons, Vancouver, Wash., machine shop for Aluminum Co. of America.
- 270 Tons, Davis, Cal., underpass; bids May 1.

## FABRICATED PLATES

### AWARDS

- 2200 Tons, St. Louis, 5,000,000 cu. ft. gas holder for St. Louis County Gas Co., to Stacey Bros. Gas Construction Co., Cincinnati.
- 825 Tons, Mono County, Cal., Leavine Creek conduit for Los Angeles Department of Water and Power (Specifications 3374), to Consolidated Steel Corp., Los Angeles, through A. Teichert & Son, Inc., Sacramento, Cal., contractor.
- 580 Tons, Wiot, Mont., tunnel liners (Invitation 425-40-3, Lot 1), to Chicago Bridge & Iron Co., Chicago.
- 500 Tons, Toledo, elevated water tank for city, to Pittsburgh-Des Moines Steel Co., Pittsburgh, on bid of \$79,305.

## PENDING PROJECTS

- 235 Tons, Los Angeles, service gates and accessories for Sepulveda Dam (Invitation 74); bids being checked.
- 130 Tons, Piedmont, Mo., liner plates for Clearwater Dam; bids April 23.

## SHEET PILING

### AWARDS

- 1300 Tons, Cleveland, Cuyahoga River improvement, contract No. 23, to Bethlehem Steel Co., Bethlehem, Pa., through L. A. Wells Construction Co., Cleveland.
- 205 Tons, Wausau, Wis., retaining wall, to Inland Steel Co., Chicago.

## PENDING PROJECTS

- 655 Tons, Cleveland, Cuyahoga River improvement, cuts 9C and 5A, contract No. 21; bids April 18.
- 575 Tons, Cleveland, Cuyahoga River improvement, cut No. 1, contract No. 24 (94 tons of accessories); Great Lakes Dredge & Dock Co., Cleveland, low bidder.
- 540 Tons, Cleveland, Cuyahoga River improvement, cut No. 8, contract No. 33; Great Lakes Dredge & Dock Co., Cleveland, low bidder.
- 500 Tons, Kansas City, Mo., Grand Avenue viaduct; bids April 30.
- 206 Tons, Cleveland, West 49th Street overpass; bids in.

## ... PIPE LINES ...

Southern Natural Gas Co., Birmingham, has announced an expansion program involving an expenditure of \$3,000,000, work to be begun within 30 days. It will include 75 miles of lines to parallel existing 22-in. transmission lines from Monroe, La., to Atlanta, Ga., and will provide 30,000,000 additional cu. ft. of natural gas per day for distribution. Program also includes building compressor station at Cedertown, Ga., and additional engines at stations at Onward, Miss., Pickens, Ala., Louisville, Miss., Atlanta, Ga., and Birmingham. This is in addition to line from Calhoun, Ga., to Chattanooga, Tenn., previously announced. Executive offices of company are in Birmingham. C. P. Rather, is president.

Southern Minerals Corp., Mineral Wells, Tex., has plans for new 10-in. welded steel pipe line from East White Point oil field, San Patricio County, Tex., to point near Corpus Christi, Tex., crossing Neches Bay, about 40 miles, for crude oil transmission. Pipe line gathering system will be installed in oil field area noted. Cost about \$90,000 with booster stations and other operating facilities.

Continental Oil Co., Ponca City, Okla., plans new 4-in. pressure pipe line from Wade City, Tex., oil field to connection with main pipe line system near Alice, Jim Wells County, Tex., more than 30 miles, for crude oil transmission. Proposed to use cast iron welded pipe. Bids are being asked for construction.

Harry S. Joseph, Salt Lake City, Utah, representing gas utility interests, has applied to Idaho State Public Utilities Commission, Boise, for permission to construct new welded steel pipe line for natural gas transmission in different parts of state. Proposed line will extend from natural gas field district in northern Idaho to Ashton, Fremont County, and to Pocatello, Bannock County, respectively, with terminal and control stations to be located at these points, where natural gas service will be furnished. Also similar service will be supplied in several communities along routes of pipe lines. Cost about \$7,500,000 with booster stations, control houses and other operating facilities.

United States Engineer Office, New Post Office Building, Pittsburgh, asks bids until May 8 for 4600 lb. of steel pipe, in connection with construction of outlet works, control shaft and control tower for Youghiogheny Dam on Youghiogheny River, for which bids are being received at same time (Circular 600).

Philadelphia Electric Co., Philadelphia, has authorized appropriation of \$770,000 for extensions and improvements in gas properties, including pipe line additions and replacements, station facilities and other structures.

Scott, La., plans pressure pipe line system for natural gas distribution. Special election has been called on May 21 to vote bonds for \$20,000 to defray part of cost.

# PLANT EXPANSION AND EQUIPMENT BUYING

## ◀ NORTH ATLANTIC ▶

**Certain-teed Products Corp.**, 100 East Forty-second Street, New York, roofing products, plans expansion and modernization in branch plant at York, Pa., including equipment. Cost over \$200,000. Also will build two-story addition to branch plant at Marseilles, Ill., used for production of heavy building papers, insulating board, etc. Cost close to \$60,000 with equipment.

**American Can Co.**, 230 Park Avenue, New York, has purchased two-story building at 57-109 Dey Street, Jersey City, N. J., on site 241 x 648 ft., for consideration of \$150,000. Structure is located near plant of purchasing company and will be used for expansion in storage and distribution.

**Quartermaster Supply Officer**, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until April 23 for one electric industrial warehouse tractor and 10 industrial warehouse trailers, with rubber tires (Circular 626-318).

**I. Rokeach & Sons**, 240 Wythe Avenue, Brooklyn, soaps, washing powders, etc., have purchased former plant of Farmers' & Packers' Co., Farmingdale, N. J., about 20,000 sq. ft. floor space, on three-acre tract, and will improve for new food products processing and canning plant, another division of output now being developed.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until April 26 for two motor-driven, 36-in. gear shapers (Schedule 1345) for Brooklyn Navy Yard; feed-water heaters, deaerating type, with spare parts, tools and wrenches (Schedule 1341); until April 23, electric cable (Schedule 1323), motor-generator gyro stabilizers and spare parts (Schedule 1303) for Brooklyn and Philadelphia yards.

**Flush Metal Partition Corp.**, 22-14 Fortieth Avenue, Long Island City, metal products, has purchased two-story building at 46-10 Eleventh Street, on site 100 x 100 ft., with adjoining tract, for plant, expanding present capacity.

**Pepsi-Cola Co.**, North Pearl and Tivoli Streets, Albany, N. Y., has asked bids on general contract for one-story mechanical-bottling plant, 108 x 115 ft., with storage and distributing facilities. Cost close to \$50,000 with equipment. Gander & Gander, 17 Steuben Street, are architects.

**Commanding Officer**, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until April 25 for alloy steel tubes (forgings) for 37-mm. guns (Circular 576), breech ring forgings for 90-mm. guns (Circular 577), seamless steel tubing (Circular 578), steel springs (Circular 582).

**Schaefer Brewing Corp.**, 430 Kent Avenue, Brooklyn, has filed plans for three-story addition, 142 x 200 ft., for new mechanical-bottling department. Cost about \$500,000 with equipment. Eggers & Higgins, 542 Fifth Avenue, New York, are architects.

**H. A. Wegner**, 88 Coit Street, Irvington, N. J., has bought one-story building, location noted, about 12,000 sq. ft. floor space, and will remodel for steel wire-drawing plant.

**Monarch Cutlery Mfg. Co.**, 411 Twenty-fourth Street, Guttenberg, N. J., has let general contract to Bonanno Construction Co., 1827 Bergen Turnpike, North Bergen, N. J., for new one-story plant, about 75 x 100 ft., at North Bergen. Cost close to \$45,000 with equipment. James J. Rothstein, 220 Hutton Street, Jersey City, N. J., is architect.

**Commanding Officer**, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until April 22 for ignition cartridges (Circular 1370), chip spinner (Circular 1361); until April 26, 1,000,000 lower detonator sockets for P. D. fuzes (Circular 1322).

**Badenhausen Corp.**, Cornwells Heights, Pa.,

boilers, heaters, etc., plans one-story addition. Cost close to \$45,000 with equipment. Company is affiliated with Riley Stoker Corp., Worcester, Mass.

**Naval Aircraft Factory**, Navy Yard, Philadelphia, asks bids until April 22 for aluminum alloy wire (Aero Req. 1014); until April 23, aluminum bronze propeller hub rear cones for airplane engines (Aero Req. B-502-2804), aluminum alloy wire (Aero Req. B-502-2955); until April 24, 60,000 self-locking, aluminum alloy nuts (Aero Req. B-502-2790).

**Mathieson Alkali Works, Inc.**, 60 East Forty-second Street, New York, heavy chemical products, plans expansion in branch plant at Lake Charles, La., for increased capacity of soda ash, caustic soda and synthetic salt cake. Cost close to \$1,500,000 with machinery.

## ◀ BUFFALO DISTRICT ▶

**Dolomite Marine Corp.**, 183 Main Street East, Rochester, N. Y., plans ship repair and maintenance plant for company barges and other river craft, on Irondequoit Bay. Cost close to \$50,000 with equipment.

**Washburn Crosby Co.**, Marine Trust Building, Buffalo, flour, cereals, etc., has let general contract to Hydro Construction Co., Stock Exchange Building, Buffalo, for rebuilding part of mill on South Michigan Street, recently destroyed by fire. Cost over \$250,000.

**New York State Electric & Gas Corp.**, Elmira, N. Y., plans one-story equipment repair and maintenance building at State and Market Streets. Cost close to \$50,000.

## ◀ NEW ENGLAND ▶

**Vermont Foundries, Inc.**, Bridge Street, Springfield, Vt., grey iron castings, has let general contract to Harty Blaney Construction Co., 25 Huntington Avenue, Boston, for one-story addition, 100 x 100 ft. Cost close to \$65,000 with equipment.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until April 23 for one core sand mixer and molding sand mixing unit (Schedule 1318) for Newport, R. I. Naval Air Station.

**Old Colony Gas Co.**, 39 Quincy Avenue, Braintree, Boston, plans rebuilding gas plant at East Braintree recently destroyed by fire, caused by explosion. Loss about \$450,000 with compressor station, gas holder and other structures.

**Commanding Officer**, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until April 22 for gages, including thread, check, plug, snap, twin ring, adjustable snap, etc. (Circular 349).

**General Electric Co.**, Pittsfield, Mass., has let general contract to J. W. Bishop Co., 109 Foster Street, Worcester, Mass., for one-story addition to plastic products plant. Cost close to \$50,000 with equipment.

## ◀ WASHINGTON DIST. ▶

**Contracting Officer**, Office of Chief of Engineers, Munitions Building, Washington, asks bids until April 25 for power shovels and trailers (Circular 137).

**Bureau of Yards and Docks**, Navy Department, Washington, asks bids until May 1 for two dry kiln units at Naval Experimental Model Basin, Carderock, Md., including fireproof doors, heaters, humidifiers, motor-driven fans, transfer trucks and rails, precision apparatus for indicating, recording and controlling temperature and humidity, and accessories (Specifications 9711).

**Board of District Commissioners**, District Building, Washington, asks bids until April 23 for vocational school at Industrial Home School for Colored Children.

**General Purchasing Officer**, Panama Canal,

Washington, asks bids until April 22 for steel cap and steel wood screws, brass machine and brass wood screws, machine screw nuts, steel and split brass cotter pins, brass plumb bobs, etc. (Schedule 4000); until April 23, splice bars for 90-lb. rail (Schedule 4007), 66,000 lin. ft. of copper wire cloth, 20,000 lin. ft. of galvanized steel wire cloth, 30,000 lin. ft. of galvanized steel wire poultry netting, galvanized steel ring bolts, brass grommets, screw pin shackles, gas regulators, two 1000-lb. platform weighing scales (Schedule 4001); until April 24, machine bolts, machine screws, carriage and galvanized deck bolts, steel nuts, brass nuts, lock washers, plate washers, steel rivets, and iron or steel expansion shields (Schedule 4005).

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until April 23 for one motor-driven bench lathe and spare parts (Schedule 1297) for Newport News, Va.; electric drills (Schedule 1245); until April 26, 200 steel drums (Schedule 1286), motor-driven swaging machine (Schedule 1268); until April 30, electric storage batteries and parts (Schedule 1284) for Eastern and Western Navy yards; until April 26, steel boiler tubes (Schedule 1289) for Norfolk, Va., and Mare Island yards; 300 acetylene gas cylinders (Schedule 1302) for Sewalls Point, Va., and Eastern and Western yards.

## ◀ WESTERN PA. DIST. ▶

**Aluminum Co. of America, Inc.**, Gulf Building, Pittsburgh, has purchased about 30 acres adjoining plant on Magnolia Avenue, Vernon district, Los Angeles, for several one-story additions to double present capacity. Plant is used primarily for production of light metal castings for aircraft and expansion will include foundry and other units. Cost about \$2,000,000 with equipment.

**Gulf Oil Corp.**, Gulf Building, Pittsburgh, plans expansion and improvements in branch oil refinery at 30th Street and Penrose Avenue, Philadelphia, where more than 25 acres adjoining has been acquired. New production units will be installed, with additional steel tanks and other facilities for loading and shipping. Company is negotiating with city officials for closing several streets extending through purchased property, and will begin work as soon as permission has been secured. Cost close to \$5,000,000 with equipment.

## ◀ OHIO AND INDIANA ▶

**National Box & Can Co.**, 4131 Broadway, Cleveland, metal boxes and other containers, plans one-story addition, 85 x 140 ft., with extension, 35 x 90 ft. Cost close to \$50,000 with equipment.

**Babcock Aircraft Corp.**, Major Fred L. Foster, Akron, Ohio, president, has leased one-story building at Deland, Fla., for new plant, including parts production and assembling divisions. Company is negotiating for purchase of about 10 acres near Deland municipal airport for permanent plant, erection to begin this year. Cost over \$75,000 with equipment. Offices have been leased in Conrad Building, Deland, for executive and engineering departments. V. C. Babcock is vice-president in charge of engineering. Allen L. Bryant, Orlando, Fla., is vice-president.

**Cincinnati Milling Machine Co.**, Forrer and Marburg Avenues, Cincinnati, will begin superstructure soon for one-story addition, 100 x 243 ft., for which general contract has been let to Austin Co., Cleveland. Cost about \$100,000 with equipment.

**Allison Engineering Division**, General Motors Corp., Speedway City, Indianapolis, aircraft engines and parts, has asked bids on general contract for six one-story additions for expansion in parts production and assembling departments. Cost about \$800,000 with equipment. J. Lloyd Allen, Architects' and Builders' Building, is architect.

**Contracting Officer**, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until April 22 for 15 metal and wood bandsaws, seven metal or wood circular saws, 16 power hacksaws, contour metal-sawing machine, metal-cutting circular saw, all motor-



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driven (Circular 1316); until April 23, five engine mount assemblies (Circular 1327), two combination brakes and folders, sheet metal brake, motor-driven bench filer, bench notching machine, motor-driven vertical bending rolls, bench lever shear, two motor-driven nibbler shears, two slitting shears, hand-power rotary shear (Circular 1323).

## ◀ MICHIGAN DISTRICT ▶

**Chrysler Corp.**, 341 Massachusetts Avenue, Detroit, has let general contract to O. W. Burke Co., Fisher Building, for one and two-story addition to parts plant in Highland Park district, 135 x 577 ft., for a machine shop and press building, replacing two smaller buildings. Cost over \$250,000 with equipment. **Albert Kahn, Inc.**, New Center Building, is architect and engineer.

**Hayes Mfg. Corp.**, Grand Rapids, Mich. (formerly Hayes Body Corp.), automobile bodies, plans expansion and modernization in plant of McCauley Steel Propeller Co., Dayton, Ohio, aircraft propellers, etc., recently acquired. Cost over \$45,000.

**Saginaw Steering Division**, General Motors Corp., Saginaw, Mich., automobile steering wheels, gears, etc., will soon begin erection of one-story addition, 150 x 160 ft. Cost close to \$85,000 with equipment. **Frantz & Spence**, 118 North Washington Avenue, are architects.

## ◀ SOUTH ATLANTIC ▶

**Crompton & Knowles Loom Works**, 301 Cedar Street, Charlotte, N. C., textile machinery and parts, has let general contract to J. J. McDevitt Co., Builders' Building, for one-story factory branch, storage and distributing plant at 1505 Hutchison Avenue. Cost about \$40,000 with equipment. Main offices are at Worcester, Mass.

**Bureau of Yards and Docks**, Navy Department, Washington, asks bids until May 8 for power plant at Naval Air Station, Jacksonville, Fla. (Specifications 9414).

**Charlotte Pepsi-Cola Bottling Co., Inc.**, 105 East Kingston Avenue, Charlotte, N. C., has let general contract to R. C. Hicks, Piedmont Building, for new one-story mechanical-bottling, storage and distributing plant of two units, 65 x 120 ft., for main production division, and 60 x 120 ft., for general service, shop and garage. Cost about \$70,000 with equipment. **M. R. Marsh**, Builders' Building, is architect.

## ◀ SOUTH CENTRAL ▶

**Grand Pop Bottling Co.**, 810 West Fifth Street, Cincinnati, plans new two-story and basement mechanical-bottling, storage and distributing plant at Lexington, Ky. Cost over \$50,000 with equipment. **J. T. Gillig**, Radio Building, Lexington, is architect; **Carl J. Kiefer Associates, Inc.**, Schmidt Building, Cincinnati, is consulting engineer.

**Mississippi River Commission**, Vicksburg, Miss., asks bids until April 23 for three pumping units and auxiliary equipment, each with capacity of 2250 gal. per min. (Circular 57); until May 7, one gasoline engine crawler-type tractor, not less than 54 hp. at drawbar, with angle-bulldozer towing winch and belt pulley (Circular 58).

**Brown & Shea**, 441 West Short Street, Lexington, Ky., machinists and welders, have let general contract to Lexington Quarry Co., Inc., 760 North Lime Street, for one-story machine shop, 40 x 90 ft.

**Director of Purchases**, Tennessee Valley Authority, Knoxville, Tenn., asks bids until May 3 for two hydraulic turbines, with governor systems, for Units Nos. 9 and 10 at hydroelectric power plant at Wilson dam; also for electric generators for two turbines noted.

## ◀ MIDDLE WEST ▶

**American Flange & Mfg. Co.**, 825 South Kilpatrick Avenue, Chicago, weldless flanges and other engineering products, has let general contract to Edward L. Ward, 4722 Arthington Avenue, for one-story unit, 25 x 135 ft., for storage and distribution. Cost close to \$40,000 with equipment. **Nordlie &**

**Co.**, 11106 South Michigan Avenue, are architects.

**Contracting and Purchasing Officer**, Air Corps, Chanute Field, Rantoul, Ill., asks bids until April 23 for monorail system, with parts and accessories (Circular 25).

**Sangamon Paper Grading Co.**, 3915 South La Salle Street, Chicago, has acquired former Outagamie paper mill of Patten Paper Co., Kaukauna, Wis. New owner will modernize and install equipment for production of kraft wrapping papers and other stocks.

**City Council**, Hutchinson, Minn., plans new municipal light and power plant. Proposed to use diesel engine-generating units, with capacity for furnishing service for rural electric systems in vicinity. Cost about \$300,000 with equipment. Financing is being arranged through Federal aid.

**John Deere Tractor Co.**, Miles and Sycamore Streets, Waterloo, Iowa, will begin superstructure for one and two-story addition, 96 x 320 ft., for engineering and experimental division, for which general contract was let recently to Jens Olsen Construction Co., 18th Street. Cost close to \$100,000 with equipment.

**Commanding Officer**, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., asks bids until May 10 for 100 to 350 gun carriages, 37-mm., with accessories, tools, sighting equipment and spare parts (Circular 875).

**Fresh'nd-Aire Co.**, 2626 West Washington Street, Chicago, electric fans, parts, etc., has leased about 20,000 sq. ft. of floor space in building at 216 North Clinton Street for plant.

## ◀ SOUTHWEST ▶

**Atlas Powder Co.**, Delaware Trust Building, Wilmington, Del., has approved plans for expansion in powder works at Duenweg, Jasper County, Mo., comprising seven main production units and auxiliary buildings, with packing, storage and distributing facilities. Cost over \$40,000 with equipment.

**McFadden & Menzie Packing Co.**, Iola, Kan., meat packer, has approved plans for expansion and modernization in plant, including one-story addition, with processing and other equipment. Cost close to \$40,000 with equipment. **Garrold A. Griffin**, 501 Washington Street, is architect.

**Franks Mfg. Corp.**, Dawson Road, Tulsa, Okla., manufacturer of winches for oil wells, mounted on portable trucks, and other equipment, plans second-story addition to present one-story plant. Cost about \$40,000 with equipment.

**Sand Springs Bottling Co.**, 703 West Third Street, Tulsa, Okla., has acquired one-story building, 100 x 140 ft., at Second and Guthrie Streets, and will remodel for new mechanical-bottling works, converting present building for storage and distribution. Cost close to \$45,000 with equipment.

**City Council**, Hearne, Tex., plans extensions and improvements in municipal power plant and system. Bond issue of \$100,000 has been authorized for this and improvements in waterworks.

**Tokheim Oil Tank & Pump Co.**, 1114 Chenevert Street, Houston, Tex., has asked bids on general contract for one-story addition for storage and distribution. Cost about \$40,000 with equipment.

**Consolidated Chemical Industries, Inc.**, Petroleum Building, Houston, Tex., has let general contract to Austin Co., Second National Bank Building, for one-story addition, 100 x 175 ft., to plant in Manchester district. Cost close to \$65,000 with equipment.

**Stoddard County Milling Co.**, Advance, Mo., plans rebuilding grain elevator recently destroyed by fire. Loss about \$100,000 with elevating, conveying, screening and other equipment.

## ◀ PACIFIC COAST ▶

**St. Helens Pulp & Paper Co.**, St. Helens, Ore., has let general contract to George Buckler, Lewis Building, Portland, for one-story addition, 115 x 215 ft., for storage and distribution. Cost over \$75,000 with equipment.

**Bureau of Reclamation**, Denver, asks bids until April 22 for bulkhead gate tracks for

10 pairs of bulkhead gate units for Grand Coulee Dam, Columbia Basin project, Wash. (Specifications 1351-D), three 37-ft. x 19-ft. automatic radial gates for Vallecito Dam, Pine River project, Idaho (Specifications 1353-D); until April 29, one 65.5-ft. x 58.25-ft. floating bulkhead gate for spillway at Parker Dam, Arizona-California (Specifications 1354-D).

**Coca-Cola Bottling Co.**, Sacramento, Cal., has let general contract to H. W. Robertson Co., 3004 F Street, for one-story addition for mechanical-bottling unit. Cost close to \$50,000 with equipment.

**Arizona Brewing Co.**, 1129-39 East Madison Street, Phoenix, Ariz., has let general contract to D. E. Webb Construction Co., 1633 West Jefferson Street, for one-story addition for storage and distribution. Cost about \$45,000 with equipment. **Lescher & Mahoney**, Title & Trust Building, are architects.

**Construction Quartermaster**, San Francisco and vicinity, Fort Mason, Cal., asks bids until May 3 for pumping station at Hamilton Field, Cal. (Circular 6616-63).

**Valvoline Oil Co.**, Seattle, plans one-story addition for a compounding unit. Cost close to \$60,000 with equipment.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until April 23 for one double-housing planer (Schedule 1224); until April 26, two portable pipe-threading machines (Schedule 1270), milling machine (Schedule 1278), all motor-driven; until April 30, 25 electric fans and spare parts (Schedule 1320), two motor-driven turret lathes (Schedule 1298) for Mare Island Navy Yard; until April 26, two heat-treating box-type electric furnaces (Schedule 1296) for San Pedro, Los Angeles, yard; pneumatic squeeze riveting machine (Schedule 1294), two motor-generator sets (Schedule 1317) for Alameda, Cal.; valves and wrenches (Schedule 1264), eight air ejectors and spare parts (Schedule 1252) for Puget Sound yard.

## ◀ CANADA ▶

**Aluminum Co. of Canada, Ltd.**, Montreal, is erecting one-story addition to smelting plant at Arvida, Que., for production of special pigments for paint manufacture. Cost close to \$100,000 with machinery.

**Brock Machinists & Welders, Ltd.**, Brockville, Ont., has approved plans for one-story addition. Cost about \$45,000 with equipment.

**Municipal Council**, Rouyn, Que., will install sewage system to cost \$200,000.

**Canadian Associated Aircraft, Ltd.**, Montreal, has awarded contract to I. G. Ogilvie & Co., Ltd., 1440 St. Catharine Street West, for addition to plant at St. Hubert, Que., to cost \$80,000.

**J. F. Massey & Co., Inc.**, 220 East 42nd Street, New York, is having plans prepared for construction of coking plant at Thorold, Ont., to cost \$750,000.

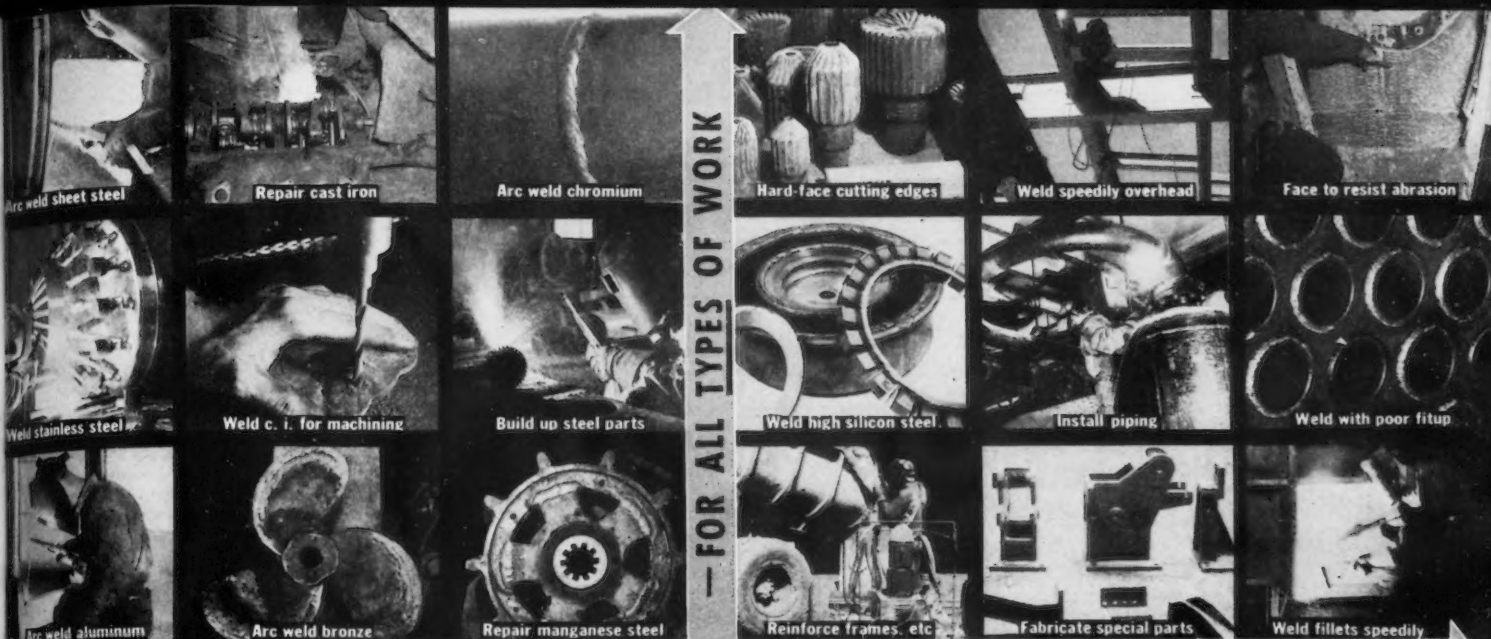
**Kelowna, B. C.**, has passed a by-law for erection of sewage disposal plant, to cost \$85,000.

**Boeing Aircraft of Canada, Ltd.**, 1927 West Georgia Street, Vancouver, B. C., has awarded contract to Baynes & Horie, 146 East Second Avenue, for aircraft plant on Terminal Avenue. **G. E. Baynes** is engineer.

## ◀ FOREIGN ▶

**General Italian Petroleum Co. (A.G.I.P.)**, Rome, Italy, plans new local plant for methane gas production, utilizing garbage and other wastes for raw material under a special fermentation process, output to be distributed through pipe lines for heating and cooking purposes. Plant will include storage holders, compressor station and other operating structures. Cost over \$500,000 with machinery.

**Cellulose Australia, Ltd.**, Millicent, South Australia, cellulose products, plans new mill at Snuggery, near Millicent, with power station, storage and distributing buildings, and other structures. Facilities will be provided for about 200 men. Cost over \$500,000, of which more than one-half will be expended for machinery. Work is scheduled to begin soon. **R. Morriss** is managing director.



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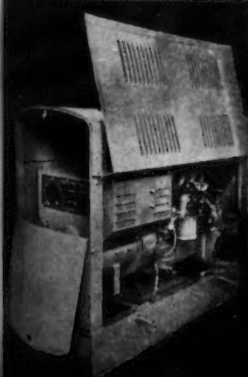
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Company \_\_\_\_\_  
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# THIS WEEK'S MACHINE ... TOOL ACTIVITIES ...

*... Foreign ordering still tends to overshadow domestic business ... Little change in the total demand reported by Cincinnati builders ... Improvement in deliveries sought by non-standard lines ... Several firms figuring on Allied munition contracts.*

## Orders Maintain Even Pace at Cincinnati

CINCINNATI—Machinery demand in this area shows relatively no change from the leveling of new business a week ago. Orders continue to flow in, but the market gyrations of previous periods have not been apparent so far this quarter. The foreign ordering continues to be substantial with a tendency to overshadow domestic business on the average. In one to two lines like drills, domestic business preponderates while lathes are about at an even balance. In other types, however, the export business is still heavier, although manufacturers report the disparity is not as great as earlier in the year. War developments and political trends are occupying a considerable amount of executive attention with the general feeling that the picture will be clarified somewhat during the next two months.

Inquiry is still good with outstanding quotations representing a large potential demand. Backlogs are heavy and the delivery situation is without appreciable change. Production is at high rate with

one or two interests still farming out substantial work.

## Builders Improving Deliveries By Concentrating Lines

CLEVELAND—Emphasis continues to center on the delivery situation, with all producers and dealers striving to make as much progress as possible. Some companies have completely abandoned production of non-essential machines and others are restricting tooling very closely. Only last week four machines which involved considerable special tooling for a plant in this district were rejected by a manufacturer. Profilers have become greatly extended on deliveries.

At Toledo the Chevrolet branch has allocated some business for 1941 model production recently. It is understood a down-state plant making diesel engine injectors has been closed out, presumably through a sale to European interests.

Used machinery for export is moving briskly here. Used turret lathes of the 2-A and 3-A types are becoming scarce with millers and horizontal boring mills.

The foundry at Wellington, Ohio, a

producer of machine tool castings, is being enlarged. Within the past week another down-state foundry contracted to produce around 500 tons of machine tool castings per month.

## Spottiness Again Prevails In the New York Market

NEW YORK—Spottiness again prevails in this district to the extent that while some dealers report a satisfactory volume of business, others indicate that an improvement in the present volume would be welcome. Except for some arsenal buying, most of the orders in the past week came from general sources, with here and there some scattered aircraft buying, but not in connection with the long overdue large buying programs expected from that source. Expansion in that industry continues. The Wright Aeronautical Corp. has acquired 450,000 sq. ft. of floor space through the purchase of the closed plant of the Textile Dyeing & Printing Co. in Fairlawn, N. J. Meanwhile a large addition on Gely Avenue, Paterson, is being rushed to completion.

War business is still largely in the talk stage here. Several firms in this vicinity are figuring on shell contracts for the Allies, but it is believed that only one contract, that for anti-aircraft shells, has been let so far.

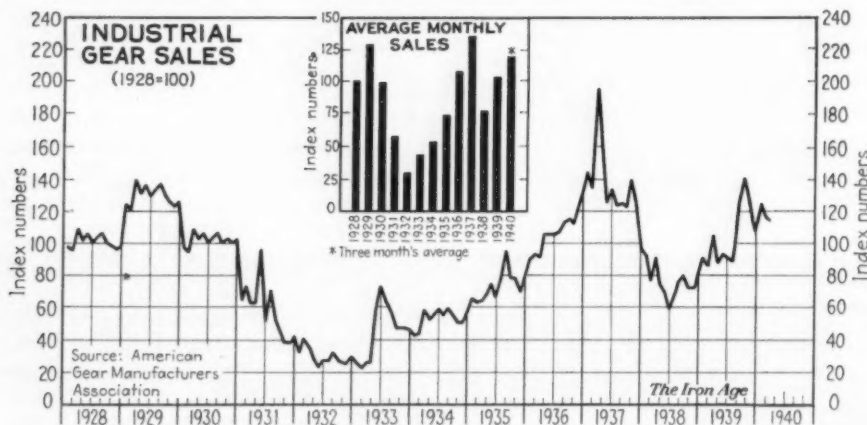
## Machinery Dealers Plan N. Y. Regional Meeting

THE Associated Machine Tool Dealers are sponsoring a New York regional meeting, Monday evening, April 22, at the Downtown Athletic Club, New York. A general invitation has been extended by Dan Harrington, chairman of the meeting, to all dealers, direct sellers and their sales representatives in the territory. Howard Dunbar, vice-president of the Norton Co. and past president of the National Machine Tool Builders' Association, will talk on the difficulties encountered in selling machine tools in both export and domestic markets during war time. F. B. Scott, Jr., vice-president of the Associated Machine Tool Dealers, will also make a few remarks, as will Jack C. Carlton, president of the Carlton Machine Tool Co. The meeting will be preceded by a dinner at 6.30 P. M.

## First Quarter Gear Sales 25% Above Year Ago

INDUSTRIAL gear sales in the first quarter of the present year were 26 per cent above the corresponding period of 1939, despite the fact that each month of the 1940 quarter showed a decline from the preceding month, the American Gear Manufacturers' Association reports. The index number of sales for

the March quarter of the current year, based on 1928 = 100, was 118, as compared with 94 in the 1939 quarter. The sales index for March stood at 114, down 2 per cent from February, but 9 per cent above March, 1939. Automotive gearing is not included in the index data.



## Machine Tool Activity In March Rises to 93.4%

CLEVELAND—March operating activity of the machine tool industry stood at 93.4 per cent of capacity compared to 92.9 per cent in February, and 93.3 per cent for January, 1940, according to the latest report of the National Machine Tool Builders' Association here.



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**STEEL MECHANICAL  
TUBING**

**THERE IS NOTHING EQUAL TO SEAMLESS**

THE IRON AGE, April 18, 1940—111

## Monthly Shipments of Finished Steel Products by United States Steel Corp.—Net Tons

Month	1936		1937		1938		1939		1940	
	Ship-ments	Per Cent of Capacity*	Ship-ments	Per Cent of Capacity*	Ship-ments	Per Cent of Capacity*	Ship-ments	Per Cent of Capacity*	Ship-ments	Per Cent of Capacity*
January .....	795,214	44.8	1,268,403	75.4	570,264	33.7	870,866	51.8		
February .....	747,375	45.3	1,252,845	82.5	522,395	35.5	747,427	49.3	1,145,592	69.8
March .....	863,946	50.5	1,563,113	92.7	627,047	37.2	845,108	50.4	1,009,256	65.8
April .....	1,080,667	63.2	1,485,231	91.0	550,551	33.7	771,752	47.5	931,905	56.8
May .....	1,087,395	63.4	1,443,477	85.5	509,811	30.2	795,689	47.4		
June .....	978,030	57.1	1,405,078	85.8	524,994	32.1	607,562	49.7		
July .....	1,050,085	61.3	1,315,353	77.9	484,611	28.8	745,364	44.5		
August .....	1,019,882	59.6	1,225,907	72.6	615,521	36.3	885,636	52.7		
September .....	1,060,708	62.0	1,161,113	71.1	635,645	37.5	1,086,683	66.9		
October .....	1,108,973	62.6	875,972	52.0	730,312	43.1	1,345,855	79.9		
November .....	974,292	59.2	648,727	39.7	749,328	45.6	1,406,205	86.1		
December .....	1,178,598	68.8	539,553	32.1	765,868	45.2	1,443,969	85.8		
Yearly adjustment.. (—)	40,163	...	(—) 87,106	...	(+) 29,159	...	(—) 44,865	...		
Total for year...	11,905,002	58.2	14,097,666	70.4	7,315,506	36.7	11,707,251	59.4		

\*Rolled and finished steel capacity.  
The above table has been revised to conform with the practice of reporting shipments on a net ton basis inaugurated by the corporation in January, 1940. Previously, monthly shipments were reported as "tons," which included both net and gross tons on an unadjusted basis.

### U. S. Steel Shipments in March Decline to 57%

SHIPMENTS of finished steel by subsidiary companies of U. S. Steel Corp. in March were 931,905 net tons, equal to 56.8 per cent of finished steel capacity, as compared with 1,009,256 tons, or 65.8 per cent, in February. Total shipments in the first three months of the present year were 3,086,753 tons, against 2,463,401 tons in the comparable period of 1939, an increase of 25 per cent. Shipments in the first quarter of the current year were equal, on an unadjusted basis,

to an average of 64 per cent of finishing capacity.

### National Defense to Be Topic of A.S.M.E. Meeting

NATIONAL defense is to be the keynote of the second annual "Spring Round-Up" of the Metropolitan section of the American Society of Mechanical Engineers, to be held at the Hotel Astor, New York, on April 25. Measures taken for the immediate coordination of machine

tool manufacture with the program of national defense in case of emergency will be explained by Charles J. Stilwell, president of the Warner & Swasey Co. and chairman of the Committee of Coordination of the Machine Tool Industry with the U. S. Government, recently formed by the National Machine Tool Builders Association. Leading off the afternoon session, Mr. Stilwell will also outline the developments which the machine tool industry has made in equipment for the mass production of ordnance, munitions and other war materials. Howard Coonley, chairman and past president of the National Association of Manufacturers, and president of the Walworth Co., will be the presiding officer.

Other speakers are R. C. Roe, president of Burns & Roe, Inc., who will speak on power networks as a factor in national defense; Captain Daniel J. Martin, chief of the aircraft armament and cannon sections, office of the Chief of Ordnance at Washington, whose topic is munitions and defense; Lt. Col. Frank R. Lahm, of the Second Corps Area, who will discuss air transportation and national defense; and Harold V. Coes, manager, industrial department, Ford, Bacon & Davis, Inc., who will close with a talk on the so-called educational orders for peacetime munitions production.

At the dinner in the evening, Warren H. McBryde, president of the A.S.M.E. and consulting engineer of San Francisco, will deliver a brief address. Frank W. Smith, past president of the Consolidated Edison Co. of New York, Inc., will act as master of ceremonies.

### Production of Open-Hearth and Bessemer Steel Ingots

(Reported by Companies Which in 1936 Made 98.67 Per Cent of the Open-Hearth and 100 Per Cent of the Bessemer Ingot Production)

1939	Reported Production (Net Tons)		Calculated Production All Companies		Number of Weeks	Per Cent of Capacity
	Open-Hearth	Bessemer	Monthly	Weekly		
January .....	3,344,830	165,193	3,555,274	802,545	4.43	52.48
February .....	3,085,746	219,728	3,347,288	836,822	4.00	54.72
March .....	3,547,915	218,057	3,814,013	860,951	4.43	56.30
1st Quarter ....	9,978,491	602,978	10,716,575	833,326	12.86	54.49
April .....	3,059,225	230,464	3,331,156	776,493	4.29	50.78
May .....	3,041,853	190,575	3,273,621	738,966	4.43	48.32
June .....	3,246,378	209,975	3,500,322	815,926	4.29	53.35
2nd Quarter ...	9,347,456	631,014	10,105,099	776,718	13.01	50.79
1st 6 months ..	19,325,947	1,233,992	20,821,674	804,858	25.87	52.63
July .....	3,241,186	256,906	3,542,038	801,366	4.42	52.40
August .....	3,885,787	276,586	4,215,027	951,473	4.43	62.22
September .....	4,347,352	332,783	4,739,067	1,107,259	4.28	72.41
3rd Quarter ...	11,474,325	866,275	12,496,132	951,724	13.13	62.23
9 Months .....	30,800,272	2,100,267	33,317,806	854,303	39.00	55.86
October .....	5,512,718	453,600	6,041,079	1,363,675	4.43	89.17
November .....	5,589,235	453,103	6,118,131	1,426,138	4.29	93.26
December .....	5,358,320	353,250	5,784,150	1,308,631	4.42	85.57
4th Quarter ...	16,460,273	1,259,953	17,943,360	1,365,553	13.14	89.30
Total .....	47,260,545	3,360,220	51,261,166	983,145	52.14	64.29
1940						
January .....	5,262,760	285,714	5,619,698	1,268,555	4.43	*83.58
February .....	4,113,446	205,527	4,374,625	1,056,673	4.14	69.62
March .....	3,990,510	191,559	4,236,050	956,219	4.43	63.00

\*Revised.